GPR Goldsmith, Prest & Ringwall, Inc.

Memorandum

To: Roland Bartl, Director of Planning and Kristen Guichard
Assistant Town Planner

From: Bruce Ringwall

Date: August 7, 2014 (revised)

Subject: FAR for Acton Crossroads, 231 Main Street

Copy: GPR file 121072, Joseph Berman, COO, Sherrill Gould, Esq., Brian Levey, Esq.

GPR has discussed the proposal for Acton Crossroads to sell Lot B-3 to their abutter E & A Northeast Limited Partnership (Edens) with you in the past. One of your concerns was the remaining land of Acton Crossroads must meet all current zoning so as to not create a non-conformant zoning issue. The recent ANR plan prepared by GPR and endorsed by Roland was submitted to create Parcel X to create the necessary setback from the access driveway pavement to the property line.

The other main issue was to show compliance with the FAR once Lot B-3 is sold to Edens. Acton Crossroads supplied GPR with stairways and elevator wells, and building service areas for the three levels of the facility. This revised number does not include any hall ways or bathrooms. This is just service areas stair and elevator wells. These spaces totaled 4,413 square feet. The tables below indicate the Developable Site Area Computation and the FAR Computation based upon the recent surveys and alternatively based upon Assessor's Information.

DEVELOPABLE SITE AREA COMPUTATION

Lot Area		157,726
	Less Lot B-3	-22,433
	Plus new Parcel X	443
Available Lot Area		135,736
Wetland Area		13,691
Flood Plain District Area		0
Zoning District Other than Principal Use Area		0
Area within an Access easement		0
Developable Site Area		**122,045**

SITE FLOOR AREA RATIO (FAR) COMPUTATION

Gross Floor Area (from Assessor's Card)		28,468	sf
Total Service areas electric etc., elevator and stair wells		4,413	sf
Developable Site Area		122,045	sf
	FAR	**0.197**	
----- or -----			
from CAD footprint	1 Floor	1,157	sf
(assuming 1ft exterior walls)	2 Floors	2,772	sf
	3 Floors	6,913	sf
		27,440	sf
Total Service areas electric etc., elevator and stair wells		4,413	sf
Developable Site Area		122,045	sf
	FAR	**0.189**	

Both methods have the FAR below the 0.20 for Kelley's Corner District as required in Section 5.6 of the Acton Zoning Bylaw.

8/11/14 040 (3)

DRB Memorandum

Date: 16 July 2014

Project Location: 267 Great Road, Acton, MA

Package Reviewed:
Stamski and McNary, Inc
Site Plan for Acton Management Inc. 267 Great Road, Date: June 27, 2014
- Existing Conditions Plan
- Grading and Drainage Plan
- Layout Plan
- Construction Details (didn't review)
- Landscape Plan

Drawings from Website reviewed:
Architect - EJ Rempelakis
Building
- Plans- Section A-A - No Date
- Elevations - No Date
- Floor Plan - No Date
- Right & Left Side Elevation - No Date

Proponent Representatives in attendance:
none

DRB Members in Attendance:
Holly Ben-Joseph (HBJ)(Landscape Architect); Peter Darlow (PD)(Architect); David Honn (DH)(Architect)

Date of DRB Review: 07-16-2014

The DRB met on the above date to review the drawings. The project is a new office building with parking on a lot with an existing single family home. It is located across Great Road from the Donelans shopping center and adjacent to another small commercial plaza to the west, and a 40B housing project to its east side. The property is shaped like an 'L', and a portion of the property lays within a wetland setback. The majority of the proposed development is located closest to Great Road, with the other heavily vegetated area being left undisturbed. The building is facing the road and parking is set to the side and back of the building.

The Design Review Board has the following comments:

Site Comments:

- The site plan works well, with most of the development closest to Great Road, and the vegetated area being left in its natural state.
- It is difficult to determine from the drawings if the existing residential building is to remain; there is no demolition plan that shows this, and there seems to be no access drive to the existing back building.

The plans submitted show conflicting information - the Grading Plan shows access via the new parking lot and the Planting Plan does not show access.

- The Design Review Board believes the site-plan works well and follows DRB Guidelines - the building is the prominent feature from the street and parking is tucked to the side and back of the building.
- The number of parking spaces is reasonable for the size of the office building.
- The DRB suggests using a material such as concrete or pavers for the walk to the building rather than an asphalt path - this would upgrade the look and quality of the pedestrian entrance to the building.
- There is an existing 18" Maple on site and it is not clear if the intent is to save this tree. On the Landscape Plan the 18" maple is shown in a planting island within the parking, on the Grading Plan, the Maple is removed for the parking lot drive. The DRB highly recommends adjusting the parking layout to keep this existing mature tree.
- The DRB suggests using a different tree other than Flowering Pear along the access drive for several reasons: 1) it is weak wooded and limbs splinter; 2) it has become an unofficial invasive plant; 3)its fragrance is offensive to many.
- The DRB recommends replacing Rugosa Rose with another flowering shrub since this plant is now an official invasive plant.
- The DRB suggests to add an outdoor seating area near the building for employees; for instance at the front or east side of the building.
- There is no North Arrow on the plans.
- What type of lighting fixtures will be used?
- Will there be any signage and if so, where?

Building Comments:

- In general, the architecture design is acceptable, thought notably very simple; the quoins on the building corners over the brick is a nice detail.
- The DRB suggests more money and design effort could be invested in a proportionately stronger entrance porch and decorative treatment at the entrance doors.
- The DRB suggests flipping the building to also point out that by doing so the office windows on the end of the building would than face toward Great Road.

In general, the DRB had a favorable opinion of the project and will support moving forward with the project if the following suggestions are incorporated into the plans.

Respectfully Submitted,

Design Review Board

TOWN OF ACTON
Health Department
472 Main Street
Acton, Massachusetts, 01720
Telephone (978) 929-6632
Fax (978) 929-6340

July 16, 2014

To: Cheryl Frazier
From: Evan Carloni, Health Department
Re: **SPSP #07-03-14-451** 267 Great Road

After reviewing the proposed plan for 267 Great Road, the Acton Health Department has the following comments:

- What is the plan for existing house on the property? Is it staying or being removed?
- If the house is staying, where is the current septic system located? We do not have currently have record of this.
- We currently do not have an approved septic plan for the new office building, which will be needed.
- Additional soil testing will be required for the septic plan since we will need two deep holes and a percolation test located in the area of primary leaching field and two deep holes and a percolation test in the area of a reserve leaching field
- This area is in a Zone 2 and Zone 3 so Article 11 and Article 16 of the Acton Board of Health Rules and Regulations must be followed. Any construction in these zones must be approved by the Acton Board of Health, requiring a meeting.
- There is also a possibility of the need for a storm water discharge permit from the Health Department depending on the final grading of the property

Please feel free to contact me with any questions you may have.

ACTON MUNICIPAL PROPERTIES DEPARTMENT

INTERDEPARTMENTAL COMMUNICATION

To: **Planning Department** ***Date:*** July 18, 2014

From: **Dean A. Charter, Municipal Properties Director**

Subject: Review of SPSP # 07-03-14-451, 267 Great Road

I have reviewed the plans on file for the above noted Site Plan, and am familiar with the site. I believe the landscape plan, dated June 3, 2014, is adequate and appropriate.

Site Plan Special Permit Application

for

267 Great Road
Map E-5, Parcel 13
Acton, MA 01720

Applicant: Acton Management, Inc.
69 Great Road
Acton, MA 01720

Date: June 27, 2014

SM-4860

Stamski and McNary, Inc.
Engineering - Planning – Surveying
1000 Main Street Acton, MA 01720 (978) 263-8585

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3.9.10 LIGHTING PLAN

3.10 TRAFFIC STUDY

STAMSKI AND MCNARY, INC.
1000 Main Street
Acton, Massachusetts 01720
(978) 263-8585
FAX (978) 263-9883

JOSEPH MARCH, P.E., P.L.S.
GEORGE DIMAKARAKOS, P.E.

July 3, 2014

Acton Town Clerk
472 Main Street
Acton, MA 01720

Re: 267 Great Road

Dear Town Clerk,

On behalf of our client, Acton Management, Inc., we hereby submit the enclosed information for a *Site Plan Special Permit* pursuant to the Board of Selectmen's *Rules and Regulations for Site Plan Special Permits* and the *Town of Acton Zoning Bylaw* for the referenced site.

Very truly yours,

Stamski and McNary, Inc.

James Melvin, E.I.T.

George Dimakarakos, P.E.

STAMSKI AND MCNARY, INC.
1000 Main Street
Acton, Massachusetts 01720
(978) 263-8585
FAX (978) 263-9883

JOSEPH MARCH, P.E., P.L.S.
GEORGE DIMAKARAKOS, P.E.

July 3, 2014

Acton Board of Selectmen
472 Main Street
Acton, MA 01720

Re: 267 Great Road

Members of the Board,

On behalf of our client, Acton Management, Inc., we hereby submit the enclosed information for a *Site Plan Special Permit* pursuant to the Board of Selectmen's *Rules and Regulations for Site Plan Special Permits* and the *Town of Acton Zoning Bylaw* for the referenced site.

Very truly yours,

Stamski and McNary, Inc.

James Melvin, E.I.T.

George Dimakarakos, P.E.

3.1
APPLICATION
FOR A
SITE PLAN SPECIAL PERMIT

Appendix B

TOWN OF ACTON
APPLICATION FOR SITE PLAN SPECIAL PERMIT

For _____
Under Zoning Bylaw Section _____

Refer to the "Rules and Regulations for Site Plan Special Permits" available from the Building Department or the Planning Department for details on the information and fees required for this application. Contact the Planning Department at 978-929-6631 or Building Department at 978-929-6633 with any questions concerning the Rules. Incomplete applications may be denied.

Please type or print your application.

1. Location and Street Address of Site 267 Great Road

2. Applicant's Name Acton Management, Inc.
   Address 69 Great Road, Acton, MA 1720
   Telephone _____ Email _____

3. Record Owner's Name _____
   Address _____
   Telephone _____ Email _____

4. Town Atlas Map(s)/Parcel Number(s) Map E-5, Parcel 13

5. Zoning District (s) of Parcel(s) Limited Business, Groundwater Protection Zone 2 & 3

If any site plans have been filed previously for this site give file numbers: _____

The undersigned hereby apply to the Board of Selectmen for a public hearing and a site plan special permit under Section 10.4 of the Zoning Bylaw approving the attached site plan.

The undersigned hereby certify that the information on this application and plans submitted herewith is correct, and that all applicable provisions of Statutes, Regulations, and Bylaws will be complied with. The above is subscribed to and executed by the undersigned under the penalties of perjury in accordance with Section 1-A of Chapter 268, General Laws of the Commonwealth of Massachusetts.

5/9/14 _____ _____
Date Signature of Petitioner(s) Signature of Petitioner(s)

RECORD OWNER'S KNOWLEDGE AND CONSENT

I hereby assert that I have knowledge of and give my consent to the application presented above.

_____ _____ _____
Date Signature of Record Owner(s) Signature of Record Owner(s)

3.2
CERTIFIED ABUTTERS LIST

Town of Acton
472 Main Street
Acton, MA 01720
Telephone (978) 929-6621
Fax (978) 929-6340

Brian McMullen
Assessor

Locus: **267 GREAT RD**
Parcel I.D.: **E5-13**

Parcel ID	Location	Owner	Co-Owner	Mailing Address	City	ST	Zip
E4-27	254 GREAT RD	NAGOG KNOLL LLC		260 GREAT RD	ACTON, MA 01720		
E5-11	272 GREAT RD	KELMAN JONATHAN L TRUSTEE	THREE SISTERS REALTY TRUS	272 GREAT RD	ACTON, MA 01720		
E5-12	271 GREAT RD	STEINBERG STEPHEN P TRUSTEE	S M K TRUST	PO BOX 2350	ACTON, MA 01720		
E5-14	279 GREAT RD	FRIZZELL ALBERT TRUSTEE	TELLURIDE REALTY TRUST	PO BOX 393	BEDFORD, MA 01730		
E5-18	1 GABRIEL LN	ANDREW BEGGS	KEIKO BEGGS	1 GABRIEL LN	ACTON, MA 01720		
E5-5	289 GREAT RD	CAMPANELLI TRIGATE CHELMSFORD ACTON LLC		289 GREAT RD	ACTON, MA 01720		
E4-15	276 GREAT RD	274 ASSOC REAL ESTATE TRUST	C/O ALPINE PROPERTY MGMT	12 DAMONMILL SQ #EB-2S	CONCORD, MA 01742		
E5-11-1	274 GREAT RD	274 ASSOCIATES ETAL ESTATE TR	C/O ALPINE PROPERTY MGMT	12 DAMONMILL SQ #EB-2S	CONCORD, MA 01742		
E5-14-11	11 LADY SLIPPER LN	STRAWBERRY HILL FARMS	HOMEOWNERS ASSOC.	10 LADY SLIPPER LANE	ACTON, MA 01720		
E5-17	255 GREAT RD	BELLI AR REALTY LLC		271 NEVADA ST	NEWTONVILLE, MA 02460		
E5-8	275 GREAT RD	FRIZZELL ALBERT T TRUSTEE	TELLURIDE REALTY TRUST	PO BOX 393	BEDFORD, MA 01730		

Abutters and owners of land directly opposite on any public or private street or way and abutters to the abutters within three hundred feet of the property line all as they appear on the most recent applicable tax list.

HEARING NOTICES FOR ALL SPECIAL PERMITS MUST BE SENT TO THE PLANNING BOARD, TOWN HALL IN THE FOLLOWING TOWNS:

Boxborough, MA 01729	Maynard, MA 01754	Concord, MA 01742	Littleton, MA 01460
Carlisle, MA 01741	Stow, MA 01775	Westford, MA 01886	Sudbury, MA 01776

Kelly Schorr **4/14/2014**

Acton Assessors Office

3.3 USE DESCRIPTION

The existing use of the site is SINGLE FAMILY DWELLING. The proposed use of the site is for OFFICE.

There will be no storage, generation or use of hazardous materials or wastes on the site.

3.4 OTHER PERMITS AND VARIANCES

PERMITTING BODY	REQUIRED
Acton Board of Health	Disposal Works Construction Permit Aquifer Permit
Acton Conservation Commission	Order of Conditions (Acton Wetland Bylaw)
Mass Highway	Curb Cut Permit
EPA	NPDES Construction General Permit

3.5
RECORDED PLANS

Total Pages = 2

Fiduciary Deed

NANCY K. BERNIER, EXECUTOR OF THE WILL OF JOHN A. C KIMBALL, JR., late of Acton, Middlesex County, Massachusetts, Middlesex County Probate Docket No. 11P4951EA, under Power of Sale which power is conferred by the Will of the Deceased Owner, **with *Fiduciary covenants***

for consideration paid and in full consideration of
FOUR HUNDRED FIFTY THOUSAND AND 00/100 ($450,000.00) DOLLARS

grant to **SPS-ACTON, LLC,** a Massachusetts limited liability company with a principal office c/o Acton Management, Inc., 69 Great Road, Acton, Massachusetts 01720

For Registry Use

Property Address: 267 Great Road, Acton, MA 01720

A certain parcel of land, with the building(s) and improvements thereon, situated in Acton, on the Easterly side of the State Highway leading from Concord to Littleton, bounded and described as follows:

BEGINNING at the Northwesterly corner thereof at land now or formerly of E.A. Mayell and said State Highway and running

THENCE by a stone wall by said land now or formerly of said Mayell SOUTH 78° 34' EAST two hundred thirty-seven and 50/100 (237.50) feet and by a stone wall NORTH 11° 56' EAST three hundred and sixteen (316) feet to a corner of stone walls at land of Baxter, hereinafter mentioned;

THENCE by land of said Baxter by a stone wall SOUTH 67° 34' EAST one hundred forty and 5/10 (140.5) feet and SOUTH 11° 56' WEST four hundred eighty-four and 75/100 (484.75) feet to a bound at land now or formerly of Ellice;

THENCE by said State Highway NORTH 4° 44' EAST one hundred seventeen and 8/10 (117.8) feet to the corner first mentioned;

CONTAINING two and 25/100 (2.25) acres, more or less.

See plan of land in Acton surveyed for Alpheus T. Baxter by Horace F. Tuttle, May 20, 1933, recorded with Middlesex South District Registry of Deeds with deed of Alpheus T. Baxter, dated June 15, 1933, recorded with said Deeds in Book 5726, Page 397, these being all of the premises described in said deed.

Subject to easements, rights, restrictions and covenants of record if they affect the locus and are in full force and effect, expressly not intending nor meaning to extend the same in the event that they have expired by operation of law or otherwise.

Meaning and intending to convey the same premises as conveyed by virtue of deed of John A. Kimball and Alice W. Kimball to John A. C. Kimball, Jr. dated May 1, 1968, and recorded with the Middlesex South District Registry of Deeds at Book 11798, Page 633. John A. C. Kimball, Jr. died on August 9, 2011. See Middlesex Probate Docket No. 11P4851EA.

Witness my hand and seal this 5th day of September, 2012.

Nancy K. Bernier

Nancy K. Bernier, Executrix of the
Will of John A. C. Kimball, Jr.

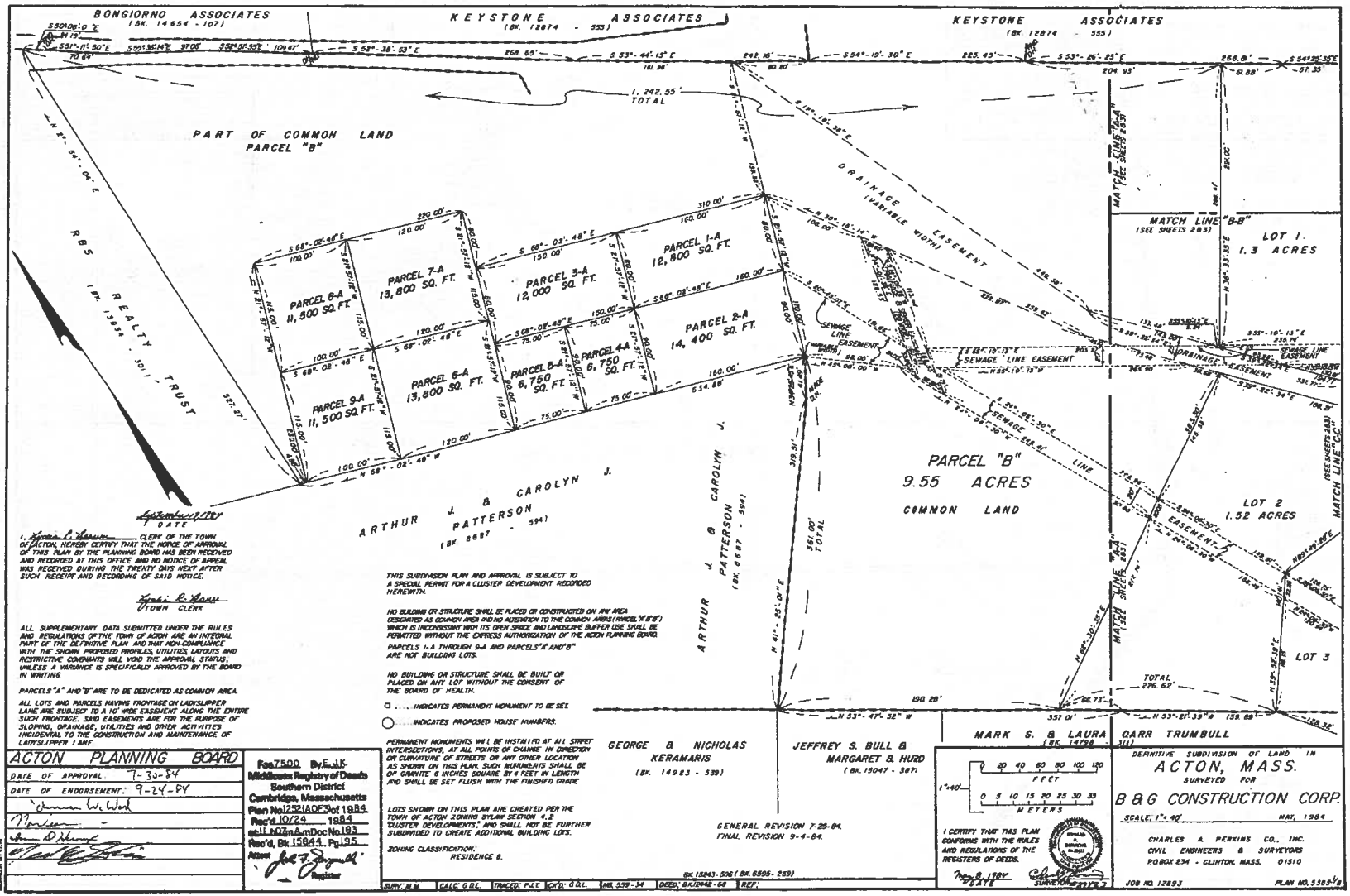
COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss:

On this 5th day of September, 2012, before me, the undersigned notary public, personally appeared Nancy Bernier, as Executrix of the Will of John A. C. Kimball, Jr., proved to me through satisfactory evidence of identification, which was ☒ driver's license, ☐ passport, ☐ employee ID card, ☐ personally known to me, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that she signed it voluntarily for its stated purpose.

Notary public:
My commission expires:

MARK L. SCHEIER
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
May 06, 2016



I, _____, CLERK OF THE TOWN OF ACTON, HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO NOTICE OF APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE

TOWN CLERK

ALL SUPPLEMENTARY DATA SUBMITTED UNDER THE RULES AND REGULATIONS OF THE TOWN OF ACTON ARE AN INTEGRAL PART OF THE DEFINITIVE PLAN AND THAT NON-COMPLIANCE WITH THE SHOWN PROPOSED PROFILES, UTILITIES, LAYOUTS AND RESTRICTIVE COVENANTS WILL VOID THE APPROVAL STATUS, UNLESS A VARIANCE IS SPECIFICALLY APPROVED BY THE BOARD IN WRITING.

PARCELS "A" AND "B" ARE TO BE DEDICATED AS COMMON AREA.

ALL LOTS AND PARCELS HAVING FRONTAGE ON LADYSLIPPER LANE ARE SUBJECT TO A 10' WIDE EASEMENT ALONG THE ENTIRE SUCH FRONTAGE. SAID EASEMENTS ARE FOR THE PURPOSE OF SLOPING, DRAINAGE, UTILITIES AND OTHER ACTIVITIES INCIDENTAL TO THE CONSTRUCTION AND MAINTENANCE OF LADYSLIPPER 1 ARF

THIS SUBDIVISION PLAN AND APPROVAL IS SUBJECT TO A SPECIAL PERMIT FOR A CLUSTER DEVELOPMENT RECORDED HEREWITH.

NO BUILDING OR STRUCTURE SHALL BE PLACED OR CONSTRUCTED ON ANY AREA DESIGNATED AS COMMON AREA AND NO ALTERATION TO THE COMMON AREAS (PARCELS "A" & "B") WHICH IS INCONSISTANT WITH ITS OPEN SPACE AND LANDSCAPE BUFFER USE SHALL BE PERMITTED WITHOUT THE EXPRESS AUTHORIZATION OF THE ACTON PLANNING BOARD.

PARCELS 1-A THROUGH 9-A AND PARCELS "A" AND "B" ARE NOT BUILDING LOTS.

NO BUILDING OR STRUCTURE SHALL BE BUILT OR PLACED ON ANY LOT WITHOUT THE CONSENT OF THE BOARD OF HEALTH.

□ ..... INDICATES PERMANENT MONUMENT TO BE SET.

○ ..... INDICATES PROPOSED HOUSE NUMBERS.

PERMANENT MONUMENTS WILL BE INSTALLED AT ALL STREET INTERSECTIONS, AT ALL POINTS OF CHANGE IN DIRECTION OR CURVATURE OF STREETS OR ANY OTHER LOCATION AS SHOWN ON THIS PLAN. SUCH MONUMENTS SHALL BE OF GRANITE 6 INCHES SQUARE BY 4 FEET IN LENGTH AND SHALL BE SET FLUSH WITH THE FINISHED GRADE

LOTS SHOWN ON THIS PLAN ARE CREATED PER THE TOWN OF ACTON ZONING BYLAW SECTION 4.2 "CLUSTER DEVELOPMENTS," AND SHALL NOT BE FURTHER SUBDIVIDED TO CREATE ADDITIONAL BUILDING LOTS.

ZONING CLASSIFICATION: RESIDENCE B.

GENERAL REVISION 7-25-84.
FINAL REVISION 9-4-84.

BK. 15243 - 576 (BK. 6595 - 269)

SURV: M.M. | CALC: G.D.L. | TRACED: P.J.C. | CK'D: G.D.L. | MB. 559-34 | DEED: BK. 10442-68 | REF:

ACTON PLANNING BOARD

DATE OF APPROVAL 7-30-84

DATE OF ENDORSEMENT: 9-24-84

Fee 7500 By E.J.K.
Middlesex Registry of Deeds
Southern District
Cambridge, Massachusetts
Plan No. 1252 1 of 3 of 1984
Rec'd 10/24 1984
at 11 h 07 m A.m. Doc No. 183
Rec'd, Bk. 15844 Pg. 195
Attest: Register

1" = 40'
0 20 40 60 80 100 120 FEET
0 5 10 15 20 25 30 35 METERS

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

DATE | SURVEYOR

DEFINITIVE SUBDIVISION OF LAND IN

ACTON, MASS.

SURVEYED FOR

B & G CONSTRUCTION CORP.

SCALE: 1" = 40' MAY, 1984

CHARLES A. PERKINS CO., INC.
CIVIL ENGINEERS & SURVEYORS
P.O. BOX 234 - CLINTON, MASS. 01510

JOB NO. 12893 PLAN NO. 5385-1/8

1252 A-3

1252-1

1252

1252 OF 1984

I, _____ CLERK OF THE TOWN OF ACTON HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO NOTICE OF APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

_____ TOWN CLERK

KEYSTONE ASSOCIATES (BK. 12874 - 555)

KEYSTONE ASSOCIATES (BK. 12874 - 555)

MATCH LINE "A-A" (SEE SHEET 1 OF 3)

MATCH LINE "B-B" (SEE SHEETS 1 & 3)

LOT 9
2.00 ACRES
STREET NO. 7

LOT 1
1.30 ACRES
STREET NO. 9

LOT 8
1.00 ACRE
STREET NO. 5

LOT 7
1.58 ACRES
STREET NO. 3

LOT 2

LOT 4

LOT 5

PARCEL "A"
5.48 ACRES
COMMON LAND

DRAINAGE EASEMENT

SEWAGE LINE EASEMENT

LADYSLIPPER LANE

FRANK E. & ROSEMARY NICHOLSON (BK. 14288 - 197)

GEORGE H. & EVELYN HODGSON (BK. 8945 - 332)

SEE DETAIL

DETAIL NOT TO SCALE

GENERAL REVISION 7-25-84
FINAL REVISION 9-4-84.
SEE NOTES ON SHEET 1/3

"STRAWBERRY HILL FARMS"

ACTON PLANNING BOARD

DATE OF APPROVAL: 7-30-84

DATE OF ENDORSEMENT: 9-24-84

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

DATE

SURVEYOR

DEFINITIVE SUBDIVISION OF LAND IN
ACTON, MASS.
SURVEYED FOR
B & G CONSTRUCTION CORP.

SCALE: 1" = 40' MAY, 1984

CHARLES A. PERKINS CO., INC.
CIVIL ENGINEERS & SURVEYORS
P.O. BOX 234 - CLINTON, MASS. 01510

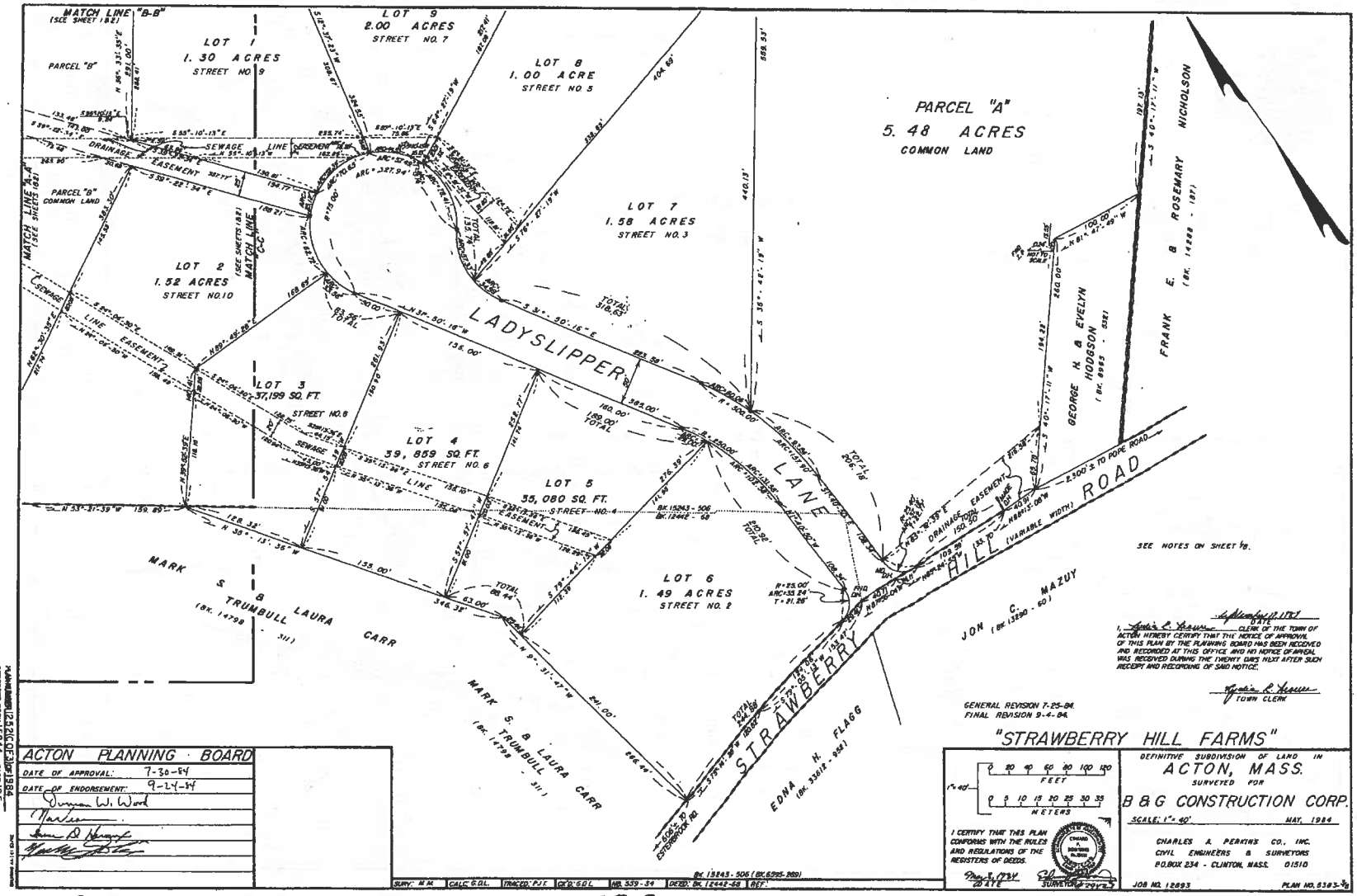
JOB NO. 12893 PLAN NO. 5383-3/3

SURV: M.M. | CALC: G.D.L. | TRACED: P.J.T. | CK'D: G.D.L. | NB: 559 34 | DEED: BK. 13442 - 69 | REF: BK. 13243 - 505 (BK. 6595 - 159)

PLANNING BOARD 25 280 OF 30 OF 1984
RECORDED BOOK 15844 PAGE 195

1252 B

1252-2



1252 C

1252-3

X-ANNOTATION 1252 COF 31 OF 1984
RECORDED BOOK 15844 PAGE 195

E-1347

PLAN REFERENCE: SEE PLAN OF LAND IN ACTON, MASSACHUSETTS, OWNED BY: THE ESTATE OF BAXTER, E.H. NELSON CIVIL ENGINEERS, 144 SUDBURY RD., CONCORD, MASS., SCALE 1"=40', MARCH 26, 1973

PARCEL "A" TO BE CONVEYED TO THE OWNER OF LOT E-5-1E.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED
ACTON PLANNING BOARD

DATE: September 13, 1977

I CERTIFY THAT THE PREPARATION OF THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS DATED JUNE 14, 1973.

REG. LAND SURVEYOR.

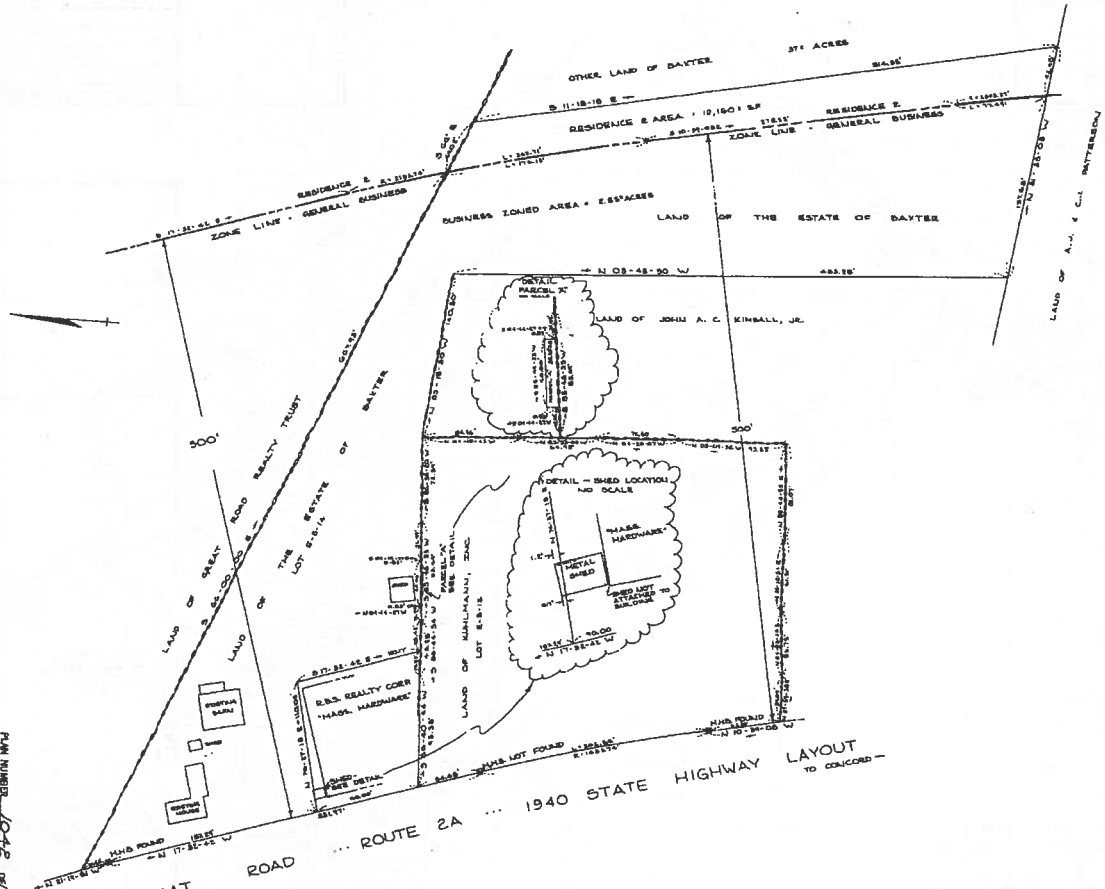
DATE: September 13, 1977

SCALE: 1" = 40'

COMPILED PLAN OF LAND IN
ACTON, MASS.
SCALE: 1" = 40' SEPTEMBER 13, 1977
SCHOFIELD BROTHERS, INC.
REGISTERED LAND SURVEYORS
1071 WORCESTER RD., FRAMINGHAM, MASS.

H2000
BY: R.

Plan Number 1047 of 1977
Book 5287 Page 484
Recorded, Book 5287 Page 484
Attest: [signature] Registrar



PLAN NUMBER 1047 OF 1977
RECORDED BOOK 5287 PAGE 484

SEE ASSESSORS SHEET "E-5", LOTS "1E AND "1A.

E-1347

1047 of 1977

B-1272

JOHN A.C. KIMBALL JR.

R&S REALTY TRUST

BROWN & GALLAGHER CONSTRUCTION COMPANY

DETAIL NOT TO SCALE

S 82° 10' 09" E

367.04

0.14

1 POST

1 POST(F)

566.62

S 82° 10' 09" E

1101.50

STONE BOUND FOUND

531.88

LOT 1

AREA = 80,207 ± S.F.

LOT 2

AREA = 3 ACRES & 27494 ± S.F.

2 1/2 STORY W/F HOUSE

GARAGE

N 67° 55' 09" W

398.42

564.45

38' WIDE DRIVEWAY & UTILITY EASEMENT (SEE DETAIL)

ARNOLD R. BELLI

GENERAL BUSINESS & RESIDENCE

N 67° 32' 22" W

178.01

107.18

N 88° 13' 00" W

GEORGE & NICHOLAS KERAMARIS

BROWN & GALLAGHER CONSTRUCTION COMPANY

361.00

319.21

S 27° 17' 40" W

500.00

GREAT ROAD

(1940 STATE HIGHWAY LAYOUT ROUTE 2A - 38.18' TO STAINBURY HILL ROAD)

HOLD

2753.63

58.50
33.83
92.33

DETAIL NOT TO SCALE

N 67° 55' 09" W

364.43

S 50° 08' 03" W

49.64

1550

N 67° 55' 09" W

38' WIDE DRIVEWAY & UTILITY EASEMENT

DETAIL NOT TO SCALE

E5-13

E5-14

E5-14-11

LOT 1

LOT 2

E5-17

E5-20

GREAT ROAD (ROUTE 2A)

LOCUS MAP
SCALE: 1" = 200'

LEGEND

DH(S) ___ DENOTES DRILL HOLE SET
DH(F) ___ DENOTES DRILL HOLE FOUND
M.H.B.(F) ___ DENOTES MASS. HIGHWAY BOUND FOUND
——— ___ DENOTES STONE WALL

RECORD OWNER: ARTHUR PATTERSON
265 GREAT ROAD
ACTON, MA., 01720

PLAN OF LAND IN
ACTON, MASS.

PREPARED FOR: ARTHUR PATTERSON
SCALE: 1" = 50' JANUARY 6, 1988
SCHOFIELD BROTHERS INC
PROFESSIONAL LAND SURVEYORS & ENGINEERS
625 MAIN STREET — BOLTON, MASS., 01740

0 25 50 100 200 FEET
0 5 10 20 40 60 METERS

Middlesex Registry of Deeds
Southern District
Cambridge, Massachusetts
Plan No. 1081 of 1988
Rec'd 8-15 1988
at 12h 52m P.M. Doc No. 667
Rec'd, Bk. 19266 Page 363
Attest: Register

RESEARCH BY: RJM
FIELD CHIEF: RJM
COMPUTED BY: SGD
DRAFTED BY: DAE
CHECKED BY: SGD
APPROVED BY: SGD

ASSESSORS MAP: E5 PARCEL: 18
ZONING DISTRICT: GENERAL BUSINESS
RESIDENCE B

Reference: Board of Appeals Decision June 9, 1988.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
ACTON PLANNING BOARD.
Peter C. Fowler
Associate Town Planner
DATE: June 27, 1988

"I CERTIFY THAT THE PREPARATION OF THIS PLAN MEETS THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS, DATED JANUARY 1, 1976.
PROFESSIONAL LAND SURVEYOR — DATE 1/6/88

Tm

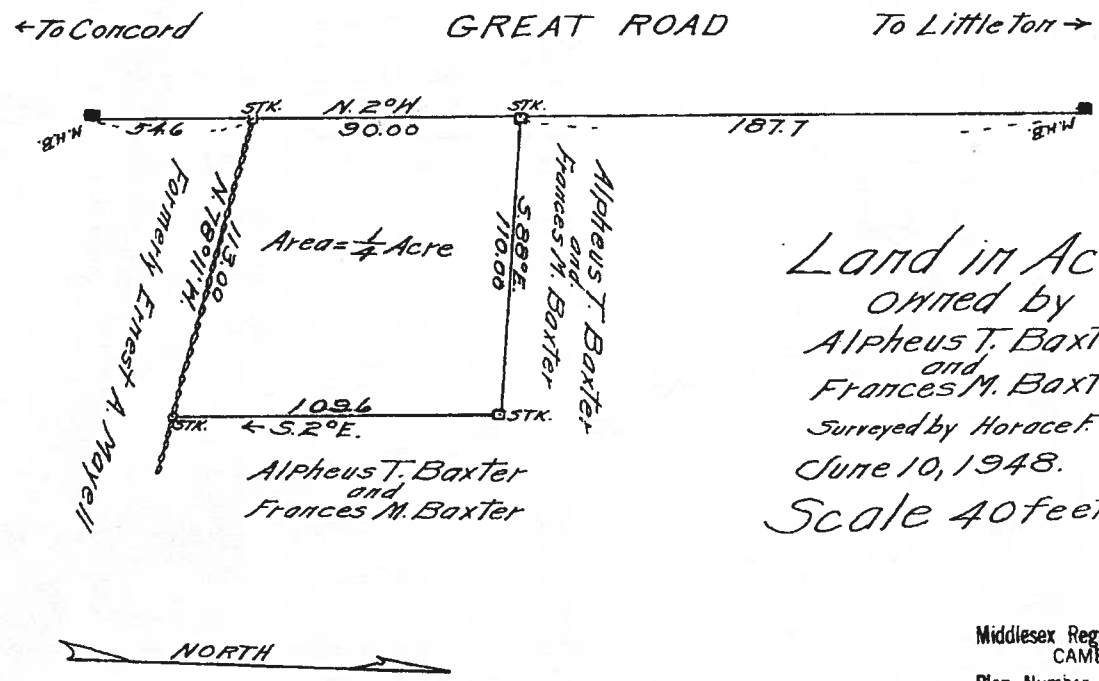
1081

B-1272

1081 of 1988

10-41-21

1883
2981

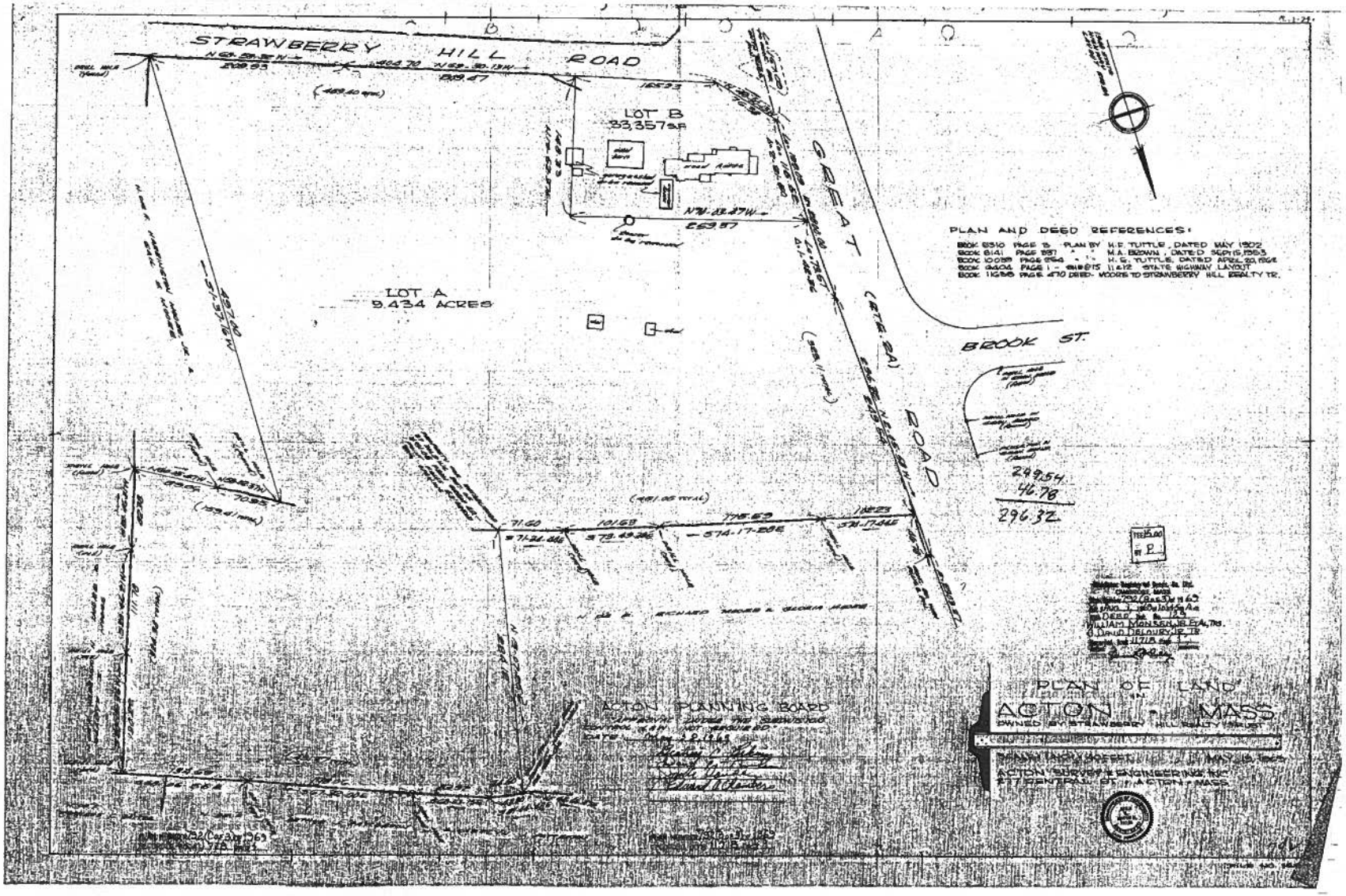


Land in Acton
owned by
Alpheus T. Baxter
and
Frances M. Baxter
Surveyed by Horace F. Tuttle
June 10, 1948.
Scale 40 feet = 1 inch

Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 883 of 1948
Rec'd July 1 1949 at 8 h 30 m a m
With Deed Doc. No. 10
Alpheus T. Baxter et ux
William W. Bursour et al
Recorded, Book 7309 Page 337
Attest: Albert P. Gutheim REGISTER

Plan Number 883 of 1948
Recorded, Bk. 7309 Pg. 337

883 - 1948


STRAWBERRY HILL ROAD
LOT B
33,357 SF
LOT A
9.434 ACRES
GREAT ROAD
BROOK ST.
PLAN AND DEED REFERENCES:
BOOK 8310 PAGE 13 PLAN BY H.F. TUTTLE, DATED MAY 1902
BOOK 8141 PAGE 557 " " M.A. BROWN, DATED SEPT 15, 1953
BOOK 10059 PAGE 254 " " H.G. TUTTLE, DATED APRIL 20, 1964
BOOK 4404 PAGE 1 - 8/8/15 11612 STATE HIGHWAY LAYOUT
BOOK 11696 PAGE 470 DEED- MOORE TO STRAWBERRY HILL REALTY TR.
249.54
46.78
296.32
ACTON PLANNING BOARD
PLAN OF LAND
ACTON MASS
OWNED BY STRAWBERRY HILL REALTY TRUST
ACTON SURVEY & ENGINEERING INC
ACTON, MASS

mn -1.a

B-1272

JOHN AC KIMBALL JR

RBS REALTY TRUST

BROWN & GALLAGHER CONSTRUCTION COMPANY

GREAT ROAD (1940 STATE HIGHWAY LAYOUT R=50.00' ROUTE 2A - 1919 CO. STRAWBERRY HILL ROAD)

1940 STATE HIGHWAY LAYOUT ROUTE 2A

LOT 1
AREA = 80,207 ± S.F.

LOT 2
AREA = 3 ACRES & 27494 ± S.F.

2 1/2 STORY W/F HOUSE

GARAGE

GENERAL BUSINESS B RESIDENCE

ARNOLD R BELLI

GEORGE & NICHOLAS KERAMARIS

BROWN & GALLAGHER CONSTRUCTION COMPANY

STONE BOUND FOUND

DETAIL NOT TO SCALE

36' WIDE DRIVEWAY & UTILITY EASEMENT (SEE DETAIL)

N 67° 55' 09" W 388.42

N 67° 55' 09" W 564.45

S 82° 10' 09" E 1101.50

S 82° 10' 09" E 566.62

S 82° 10' 09" E 569.62

531.88

319.81

S 27° 12' 40" W

N 67° 32' 22" W 178.01

N 68° 13' 00" W 107.18

N 68° 05' 23" W 86.34

N 68° 13' 17" W 143.97

N 68° 13' 17" W 32.00

S 08° 38' 24" E 207.28

50.00

LEGEND

DH(S) ___ DENOTES DRILL HOLE SET
DH(F) ___ DENOTES DRILL HOLE FOUND
MH(B)(F) ___ DENOTES MASS. HIGHWAY BOUND FOUND
——— ___ DENOTES STONE WALL

LOCUS MAP
SCALE: 1" = 200'

E5-13 E5-14 E5-14-11 LOT 1 LOT 2 E5-17 E5-20 GREAT ROAD (ROUTE 2A)

DETAIL NOT TO SCALE

References: Board of Appeals Decision June 9, 1988.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
ACTON PLANNING BOARD.
Peter C. Fowler
Associate Town Planner
DATE: June 29, 1988

"I CERTIFY THAT THE PREPARATION OF THIS PLAN MEETS THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS, DATED JANUARY 1, 1976.
PROFESSIONAL LAND SURVEYOR — DATE 1/6/88

RECORD OWNER ARTHUR PATTERSON
265 GREAT ROAD
ACTION, MA., 01720

PLAN OF LAND IN
ACTON, MASS.
PREPARED FOR: ARTHUR PATTERSON
SCALE: 1" = 50' JANUARY 6, 1988
SCHOFIELD BROTHERS INC
PROFESSIONAL LAND SURVEYORS & ENGINEERS
626 MAIN STREET — BOLTON, MASS., 01740

0 25 50 100 200 FEET
0 5 10 20 40 60 METERS

Middlesex Registry of Deeds,
Southern District
Cambridge, Massachusetts
Plan No. 1081 of 1988
Rec'd 8-15 1988
at 12h 52m p.m. Doc No. 467
Rec'd, Bk 1926 Page 363
Attest
Register

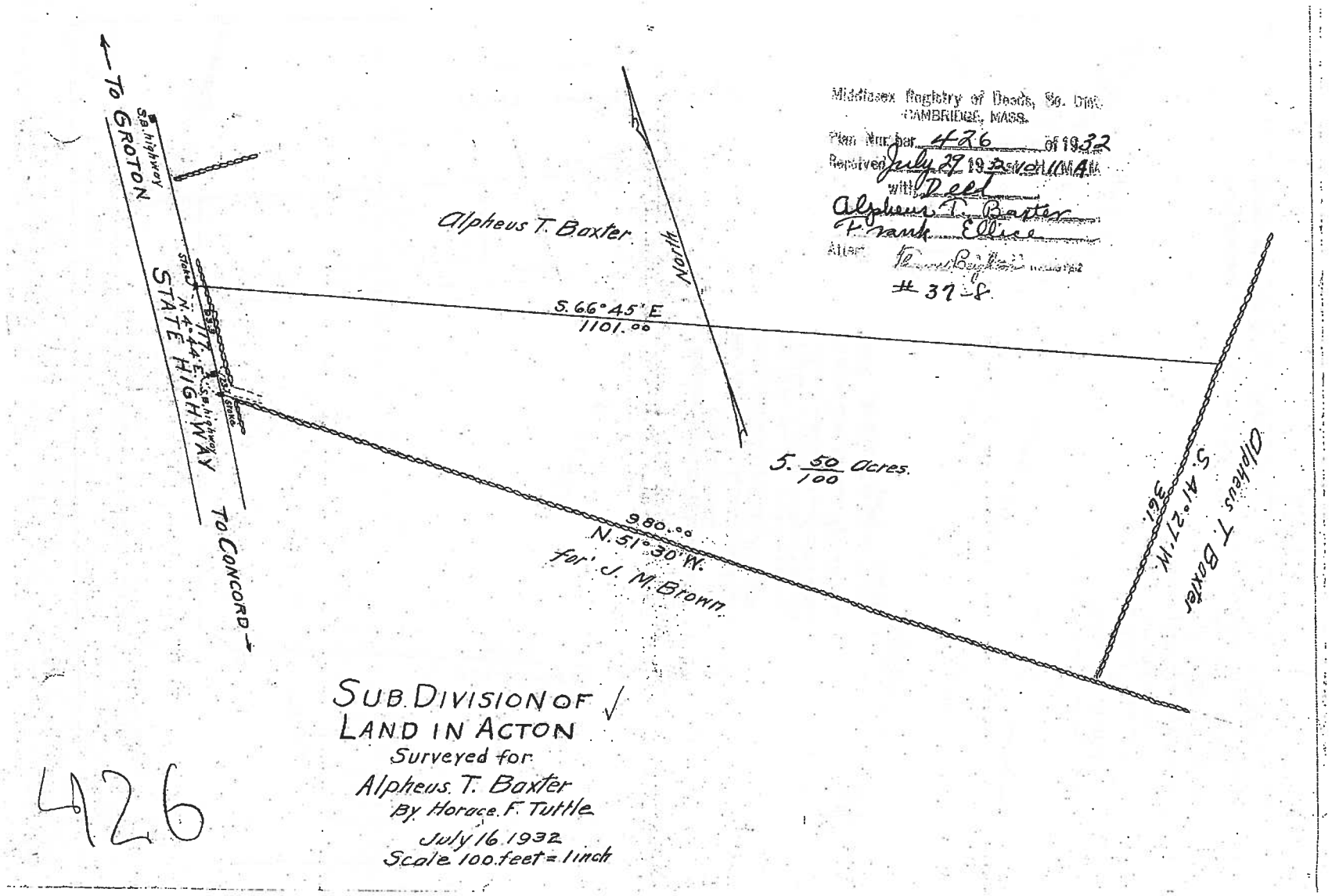
RESEARCH BY: RJM
FIELD CHIEF: RJM
COMPUTED BY: SGD
DRAFTED BY: DAE
CHECKED BY: SGD
APPROVED BY: SGD

ASSESSORS MAP: E5 PARCEL: 18
ZONING DISTRICT: GENERAL BUSINESS RESIDENCE B

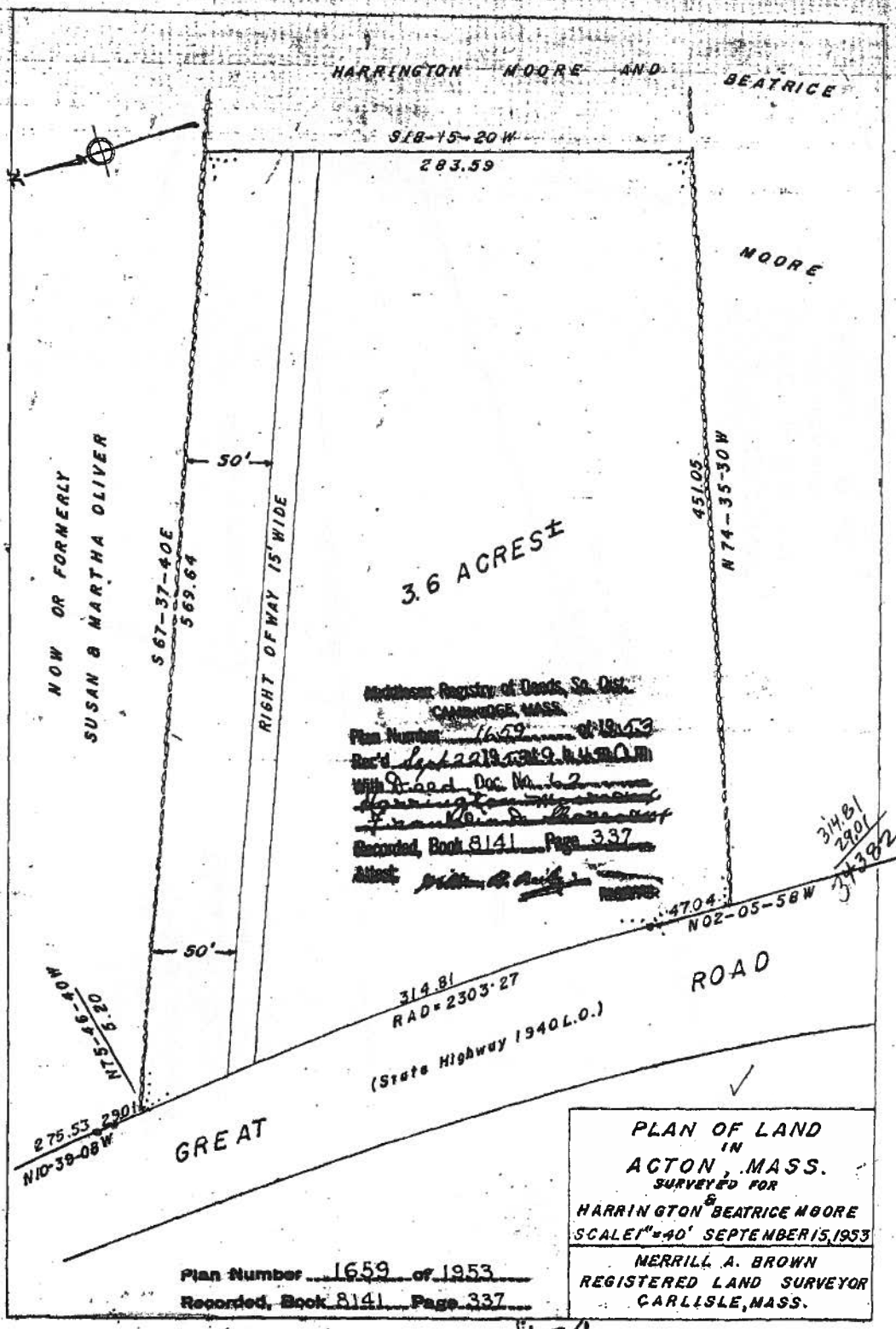
1081

B-1272

1081 of RR


Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 426 of 1932
Received July 27 1932 at 10 M 4 M
with Deed
Alpheus T. Baxter
Frank Ellice
Alter
#37-8
Alpheus T. Baxter
North
S. 66° 45' E
1101.00
S.B. highway
To GROTON
N. 44° E.
S.B. highway
STATE HIGHWAY
To CONCORD
5. 50/100 Acres.
980.00
N. 51° 30' W.
for J. M. Brown
S. 41° 27' W.
361.
Alpheus T. Baxter
SUB. DIVISION OF
LAND IN ACTON
Surveyed for
Alpheus. T. Baxter
By Horace. F. Tuttle
July 16. 1932
Scale 100. feet = 1 inch
426

426 of 32



1659 of 53

1659

RECORD OWNER

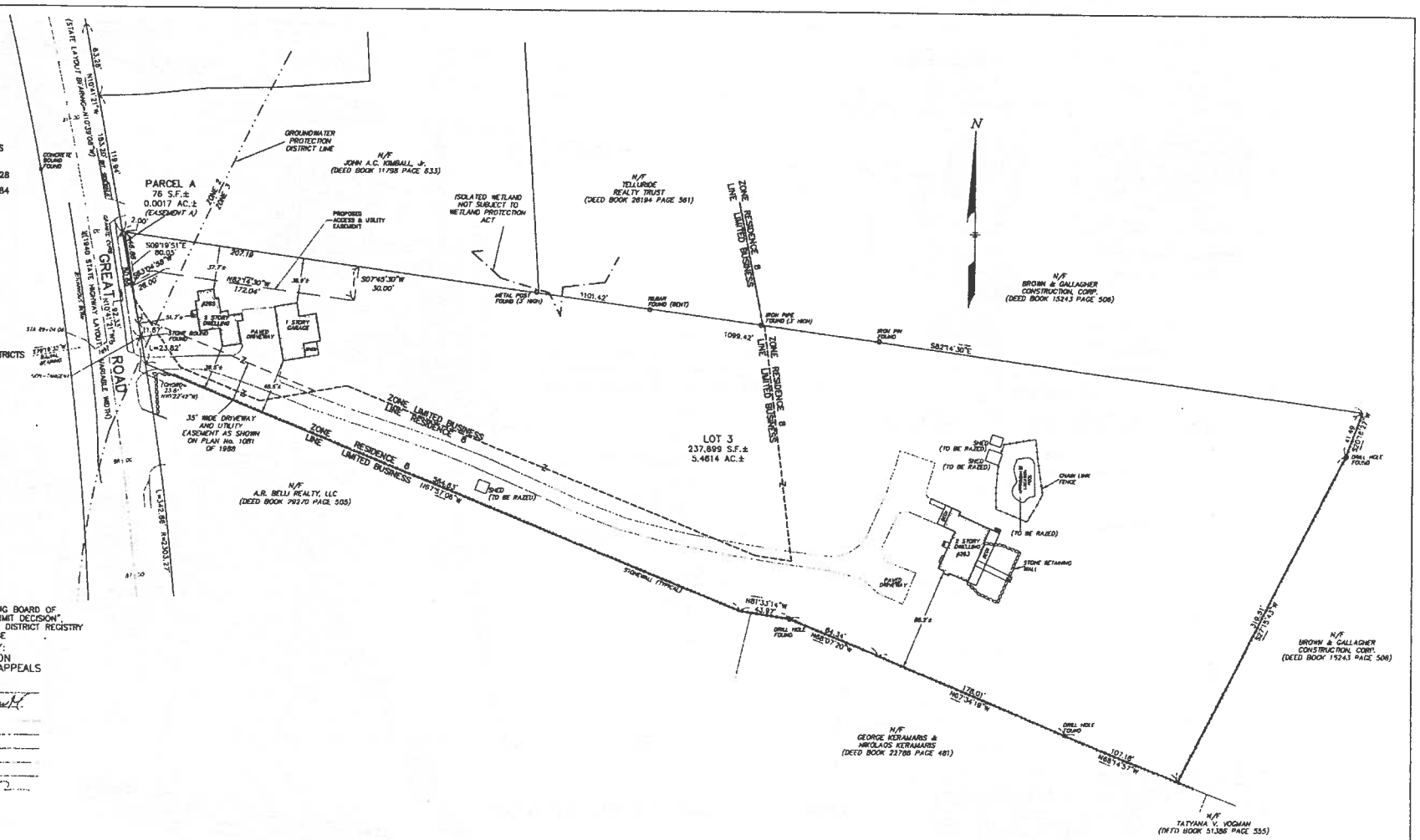
ANTHONY J. RUGGIERO, JR.
263 GREAT ROAD
ACTON, MA

REFERENCE

MIDDLESEX REGISTRY OF DEEDS
SOUTH DISTRICT
TOWN MAP E5 PARCEL 18
DEED BOOK 33151 PAGE 328
TOWN MAP E5 PARCEL 18-1
DEED BOOK 31244 PAGE 284
PLAN No. 426 OF 1932
PLAN No. 269 OF 1933
PLAN No. 521 OF 1940
PLAN No. 80 OF 1948
PLAN No. 883 OF 1948
PLAN No. 1659 OF 1953
PLAN No. 792 OF 1969
PLAN No. 1042 OF 1977
PLAN No. 1252 OF 1984
PLAN No. 1081 OF 1988

ZONING DISTRICT

RESIDENCE B
LIMITED BUSINESS
GROUNDWATER PROTECTION DISTRICTS
ZONES 2 AND 3



SEE "TOWN OF ACTON ZONING BOARD OF APPEALS COMPREHENSIVE PERMIT DECISION", RECORDED WITH MIDDLESEX SOUTH DISTRICT REGISTRY OF DEEDS IN BOOK . PAGE .

APPROVED BY:
TOWN OF ACTON
ZONING BOARD OF APPEALS

Nov. 5, 2012
DATE

NOTES:

1.) THIS PLAN IS BASED ON AN ON THE GROUND SURVEY. THE CERTIFICATION HEREON IS INTENDED TO MEET THE REQUIREMENTS OF THE REGISTRY OF DEEDS ONLY, AND IS NOT CERTIFICATION TO THE TITLE OR OWNERSHIP OF THE PROPERTY SHOWN, OR AS TO THE EXISTENCE OF RECORDED OR UNRECORDED EASEMENTS. OWNERSHIP OF ABUTTING PROPERTIES ARE FROM CURRENT ASSESSOR'S RECORDS.

2.) PARCEL A IS NOT A LEGAL BUILDING LOT. IT IS SHOWN FOR CONVEYANCE PURPOSES.

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS.

9/10/12
DATE

REGISTERED PROFESSIONAL LAND SURVEYOR

THE MEADOWS AT ACTON
COMPREHENSIVE PERMIT
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

RECORD PLAN

FOR: 263 GREAT ROAD, LLC.
SCALE: 1"=40' MARCH 29, 2012
REVISED: SEPTEMBER 10, 2012

STAMSKI AND McNARY, INC.
1000 MAIN STREET ACTON, MASS.
ENGINEERING - PLANNING - SURVEYING
978-263-6585

0 10 20 40 60 80 FT

SM-4810 (4810RECORD 1.DWG) SHEET 3 OF 10

THIS PLAN IS COMPILED FROM THE FOLLOWING DEEDS AND PLANS ON RECORD IN THE MIDDLESEX SOUTH REG OF DEEDS.
PLAN 426 of 1932 BOOK 6595 Pages 269 – 270
PLAN 269 of 1933
PLAN 883 of 1948
PLAN 564 of 1958
PLAN 46 of 1975
PLAN 1042 of 1977

Other land of Baxter (36 acres, perdeed, frontage on Strawberry Hill Rd)

S 11·18·18E 531.71'

S 10·39·08E 275.53'

R= 2805.27' L= 77.49'

R= 2183.74' L= 262.71'

L= 193.56'

S64·12·46E 17.20'

S 17·32·42E

Residential III

ZONE LINE

General Business

L=69.15'

S67·17·42E 84.95'

S 32·47·

50.71'

S70·05·53E 41.66'

S65·42·21E 101.38'

99.86'

320.03'

S 67·04·17E 220.17' dh to dh

dh fnd.

LAND OF THE ESTATE OF BAXTER

AREA RESIDENTIAL III = 19,853± S.F
AREA GEN. BUSINESS = 129,220± S.F
TOTAL AREA = 149,073±s.f.
or 3.42± Acres

N 03·45·50 W 483.28'

LAND OF JOHN A. C. KIMBALL JR.

N 81·38·03W 87.68'

LAND OF A.J. & C.H. PATTERSON

200.16'

N 83·15·50 W 140.50'

72.89'

S 86·35·20W

LAND OF PARK STREET RESOURCES INC.

N 10·39·08W

500.00'

N

DETAIL (no scale)

N.04·14·27W 0.83'

31.49'

83.49'

PARCEL "A" 33 s.f.

PARCEL "A" (Now part of land of Park Street Resources Inc.)

S.85·45·33W.

40.00'

S.85·45·33W

see plan 1042 of 1972

S04·14·27E. 0.83'

12.00'

N04·14·27W. 0.83'

Shed

S04·14·27E. 0.83'

S85·45·33W

140.00'

83.49'

S 85·45·33 W

S 86·44·54 W

43.25

28.42'

S 17·32·42E 110.17'

19.83'

R. B. S. REALTY CORP.

Existing Building "Mass. Hardware"

110.00'

N 76·27·18E

93.38'

S 86·40·44W

54.68'

MHB not found

R= 1683.74'

L= 202.56'

MHB not found

Shed (see detail)

90.00'

331.97'

N 17·32·42W 187.29'

MHB fnd. tipped

N21·19·51W. 24.50'

dh fnd. out of position 0.08N. too for 0.93E too for

S69·01·00E 64.26'

S 66·20·15E 78.07'

N.76·27·18E. 110.00'

1.2'

Metal Shed

0.7'

R.B.S Realty Corp. "Mass. Hardware"

Shed is not attached to building

500.00'

DETAIL (no scale)

N.17·32·42W. 331.97'

GREAT ROAD

GREAT ROAD Routes 2A & 119 public way
State Highway Layout (1940)

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS NOT REQUIRED. DATE: May 14, 1979
ACTON PLANNING BOARD

"I CERTIFY THAT THIS PLAN WAS PREPARED IN CONFORMANCE WITH ALL THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS."
MAY 9, 1979
R.L.S. 14837

PLAN OF LAND IN ACTON, MASSACHUSETTS

OWNED BY
THE ESTATE OF BAXTER

R.D. NELSON
CONCORD
SCALE 1" = 40'

CIVIL ENGINEER
MASS
MAY 9, 1979

GRAPHIC SCALE
0 10 25 50 75 100

Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 613 of 1979
Rec'd June 19, 1979 at 2 57 m Am
With Deed Doc. No. 309
MARTHA ANDREWS, EXTRX.
JUDITH S. SCHWARTZ, TR.
Recorded Book 13717 Page 1
Attest: John F. Zapatelli Register
SEE 1.00
BY R.

PLAN NUMBER 613 OF 1979
RECORDED BOOK 13717 PAGE 1

613 of 79

3.6 DRAINAGE CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Table of Contents

Narrative

Pre-Development Hydrology

Post-Development Hydrology

Water Quality Volume Calculations

Groundwater Recharge Calculations

TSS Removal Calculations

Storm Sewer Design

Soil Evaluation

Operation and Maintenance Manual

Drainage Maps

Narrative

STORMWATER MANAGEMENT

The site is located at 267 Great Road in Acton, Massachusetts and is approximately 2.26 acres in size and has been previously developed. There is an existing dwelling with a gravel loop driveway, two sheds, and a detached garage located on the site. The Natural Resource Conservation Service (N.R.C.S.) soil survey report for Middlesex County and associated soil map for Acton indicates that soils located on the site are Merrimac-Urban Land Complex and Hinckley Loamy Sand. Merrimac-Urban Land Complex and Hinckley Loamy Sand are in Hydrologic Group A.

Pre-Development

The site is comprised of 4 separate subcatchments. Subcatchment E1 is located to the southeast and contains a portion of the existing dwelling, a shed, and a portion of the existing gravel driveway. This subcatchment drains to the Isolated Wetland on-site. Subcatchment E2 is an entirely wooded area located to the northeast that drains off-site to the east. Subcatchment E3 is located in the northern portion of the site and contains a large area of woods and a portion of the existing dwelling and gravel driveway. This subcatchment drains off-site to the west. Subcatchment E4 contains a portion of the existing dwelling and gravel driveway and lawn and wooded areas. This subcatchment drains to a depression on-site where it is infiltrated. The subcatchments can be seen on the attached drainage maps.

Post-Development

The fully developed site will consist of the proposed office building, paved driveway, paved parking lot, and walkways. The post-development site has been divided into four subcatchments. Subcatchment P1 remains largely unchanged with the exception of the removal of the existing dwelling. The subcatchment drains to the Isolated Wetland located in the southeast corner of the site. Subcatchment P2 relates to subcatchment E2 and remains unchanged. Subcatchment P3 will also remain largely unchanged with the exception of the removal of the existing dwelling. Subcatchment P4 contains the area being developed. The runoff in this subcatchment will flow to 2 deep sump hooded catch basins and a deep sump hooded drop inlet before flowing to Contech CDS2015-4 units for pretreatment. The runoff will then be infiltrated in subsurface infiltration chambers.

This project would qualify as a "Redevelopment Project" as defined by the Stormwater Management Standards but all standards have been met. The following describes the drainage system and the projects compliance with the Stormwater Management Standards.

Standard #1 Untreated direct discharge of Stormwater:

No new direct discharges of untreated stormwater are proposed. The overland discharge to the east, west, and southeast will remain and any additional runoff will be treated and infiltrated.

Standard #2 Post-Development Peak Discharge:

The Stormwater Management Policy requires that peak discharge rates for the 2-year and 10-year storm events not be increased from pre-development conditions. Furthermore, the 100-year storm event will not increase flooding impacts offsite.

Attenuation of peak discharge rates will be accomplished by using infiltration.

The following table summarizes the peak runoff rates to the overland flow discharge points.

Discharge Summary Table

E1 Compared to P1

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.001	0.001	0.018	0.012	0.162	0.130

E2 Compared to P2

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.000	0.000	0.003	0.003

E3 Compared to P3

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.002	0.000	0.035	0.014

E4 Compared to P4

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.000	0.000	0.000	0.000

Detailed Calculations are attached.

Standard #3 Recharge to Groundwater:

This standard prescribes the stormwater volume that must be recharged to groundwater based on the existing site soil conditions. The Natural Resources Conservation Service (N.R.C.S.) Middlesex Soil Survey map indicates that the site contains soils in hydrologic group A. The stormwater management Policy requires 0.6 inches of runoff over the total impervious area to be recharged in areas with the respective soil groups. Furthermore the town's regulations require that the annual water budget is balanced to preserve groundwater supply. Detailed "Water Balance Calculations" showing compliance with this standard are attached.

Standard #4 80% TSS Removal:

According to the guidelines provided in the Stormwater Management Standards 80% Total Suspended Solids (TSS) removal is required for the total increase in impervious area associated with the project. This standard requires 1.0 inches of runoff from impervious surfaces to be treated when not in a critical area. Town Standards require 1.0 inch of runoff from impervious areas to be treated. Two proposed catchbasins, Contech CDS2015-4 inserts and subsurface infiltration structures will treat the water quality volume of 1.0 inch over the proposed impervious area. See "Water Quality Volume Calculation" attached. The combination will also remove 92.9% of TSS. See "TSS Removal Calculations".

Standard #5 Higher Potential Pollutant Loads:

The site is not considered to have a "Higher Potential Pollutant Load" as defined in the Stormwater Management Policy.

Standard #6 Protection of Critical Areas:

A portion of the site is located within a Zone II. The proposed BMPs will provide 44% TSS removal and treat the water quality volume prior to infiltration. The proposed BMPs have been determined by MassDEP to be suitable for use within a Zone II per Table CA 3.

Standard #7 Redevelopment Projects:

Although the existing site is developed and has been disturbed, the project has been designed to meet new construction standards. This standard would require that the Stormwater Management Standards be met to the extent practicable. The project has been designed to meet all of the standards.

Standard #8 Erosion/Sediment Control:

Erosion and sediment controls are incorporated into the project design to prevent erosion, control sediment movement, and stabilize exposed and disturbed soils during construction. Temporary erosion and sedimentation controls during construction include minimizing areas of exposed soil, directing and controlling runoff, and rapidly stabilizing exposed areas. Soils left exposed for extended periods will be mulched and seeded for temporary vegetative cover. Following construction, exposed areas will be permanently vegetated with appropriate ground cover. Erosion and sedimentation control measures will be maintained throughout all phases of construction. Inspections will be made regularly and after rainfalls exceeding 0.5 inches in a 24-hour period during construction. The contractor will be required to inspect erosion and sedimentation control measures at the end of each workday, when precipitation is forecasted, and after each rainfall. All measures will be inspected prior to each weekend. The contractor will replace and repair any malfunctioning or damaged control measures including vegetative stabilization.

Long term erosion and sedimentation control will be realized using the Best Management Practices described previously. Areas where soils have been disturbed will be loamed and vegetated with lawn, trees, and shrubs.

Standard #9 Operation and Maintenance Plan:

An Operation and Maintenance plan has been prepared and is shown on the plan set.

Standard #10 Illicit Discharges to Drainage System:

No known illicit discharges exist and none are proposed.

Design Basis

1. The rational method (Q=CIA) was used as a basis for sizing pipes. Runoff Coefficients: C=0.15 for woods, 0.20 for grass/landscaped areas, 0.76 for gravel, and 0.90 for impervious surfaces.
2. The 100-year storm was used for sizing pipes. Rainfall intensity values were taken from the U.S. Weather Bureau Technical Paper 40.
3. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
4. The twenty-four hour rainfall, taken from N.R.C.S. publications, is 6.4 inches for the 100-year storm, 4.5 inches for the 10-year storm, and 3.1 inches for the 2-year storm event.
5. The hydrologic calculations were performed using the computer program: "Hydraflow Hydrographs 2007" by Intelisolve.
6. The soil types of the site were taken from the N.R.C.S. Soil Survey Map from nesoil.com.
7. Soil conditions and estimated seasonal high groundwater table were based on on-site soil evaluations.
8. The Hantoush Method was used for Mounding analysis.

Pre-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.001	2	1326	15	---	-----	-----	E1
2	SCS Runoff	0.000	2	n/a	0	---	-----	-----	E2
3	SCS Runoff	0.000	2	n/a	0	---	-----	-----	E3
4	SCS Runoff	0.000	2	n/a	0	---	-----	-----	E4
5	Reservoir	0.000	2	n/a	0	4	156.00	0.000	To Depression
6	Diversion1	0.000	2	n/a	0	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	n/a	0	5	-----	-----	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.018	2	746	255	---	-----	-----	E1
2	SCS Runoff	0.000	2	n/a	0	---	-----	-----	E2
3	SCS Runoff	0.002	2	1328	33	---	-----	-----	E3
4	SCS Runoff	0.012	2	892	322	---	-----	-----	E4
5	Reservoir	0.011	2	936	319	4	156.01	29.6	To Depression
6	Diversion1	0.011	2	936	319	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	842	0	5	-----	-----	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.058	2	740	501	---	-----	-----	E1
2	SCS Runoff	0.001	2	1326	10	---	-----	-----	E2
3	SCS Runoff	0.008	2	924	237	---	-----	-----	E3
4	SCS Runoff	0.052	2	748	801	---	-----	-----	E4
5	Reservoir	0.030	2	842	798	4	156.02	80.3	To Depression
6	Diversion1	0.030	2	842	798	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	850	0	5	-----	-----	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.162	2	730	944	---	-----	-----	E1
2	SCS Runoff	0.003	2	902	74	---	-----	-----	E2
3	SCS Runoff	0.035	2	754	793	---	-----	-----	E3
4	SCS Runoff	0.206	2	740	1,750	---	-----	-----	E4
5	Reservoir	0.088	2	774	1,747	4	156.05	236	To Depression
6	Diversion1	0.088	2	774	1,747	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	902	0	5	-----	-----	Overflow

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.13	3.87
A	Open	39			0.14	5.34
	Impervious	98			0.03	2.45
A	Gravel	76			0.02	1.82
					Totals = 0.32	13.49

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{13.49}{0.32} = 42.82$; Use CN = 42.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.01	0.22	0.81
Runoff, Q.....	cf	15	252	931

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E1

Circle one: Tc Tt through subarea _____

Sheet flow (Applicable to Tc only)		Segment ID	A-B	B-C		
1. Surface Description (table 3-1)			Woods	Grass		
2. Mannings roughness coeff., n (table 3-1)			0.4	0.24		
3. Flow length, L (total L <= 300 ft)		ft	9	41		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.027	0.04		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.05	0.09		0.14

Shallow concentrated Flow		Segment ID	C-D			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	25			
9. Watercourse slope, s		ft/ft	0.06			
10. Average Velocity, V (figure 3-1)		ft/s	3.95			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.3

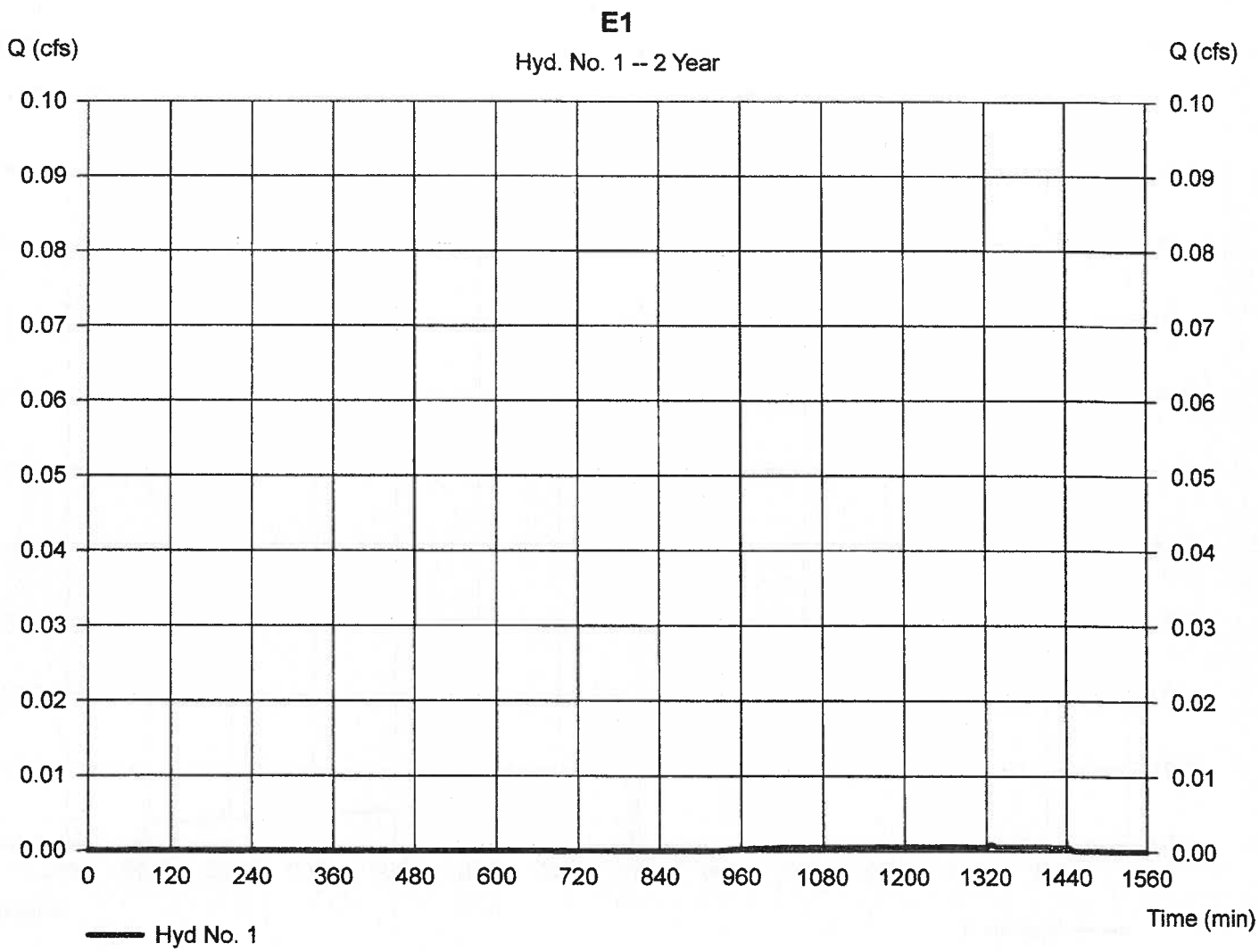
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 15 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



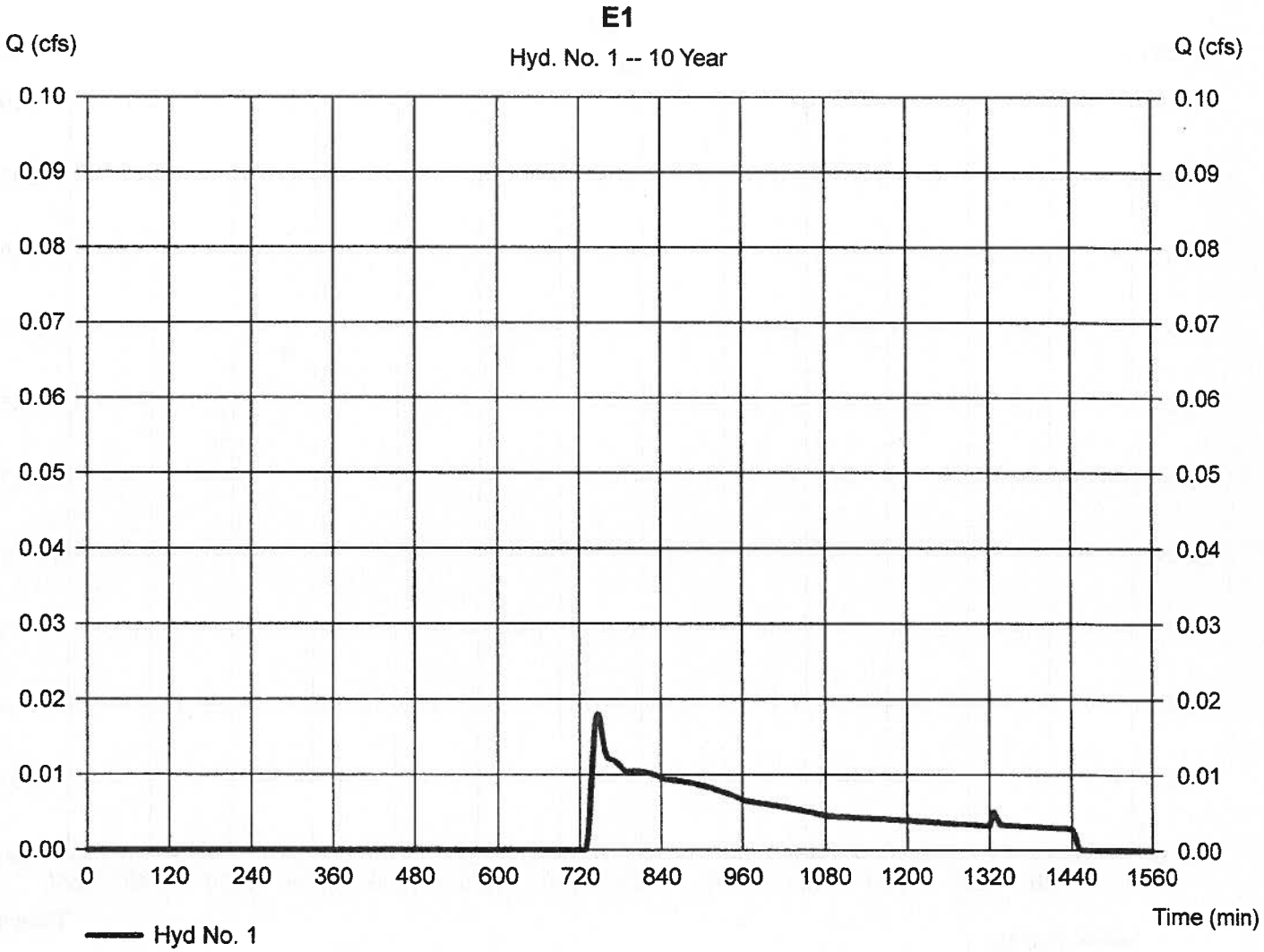
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 10 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 255 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



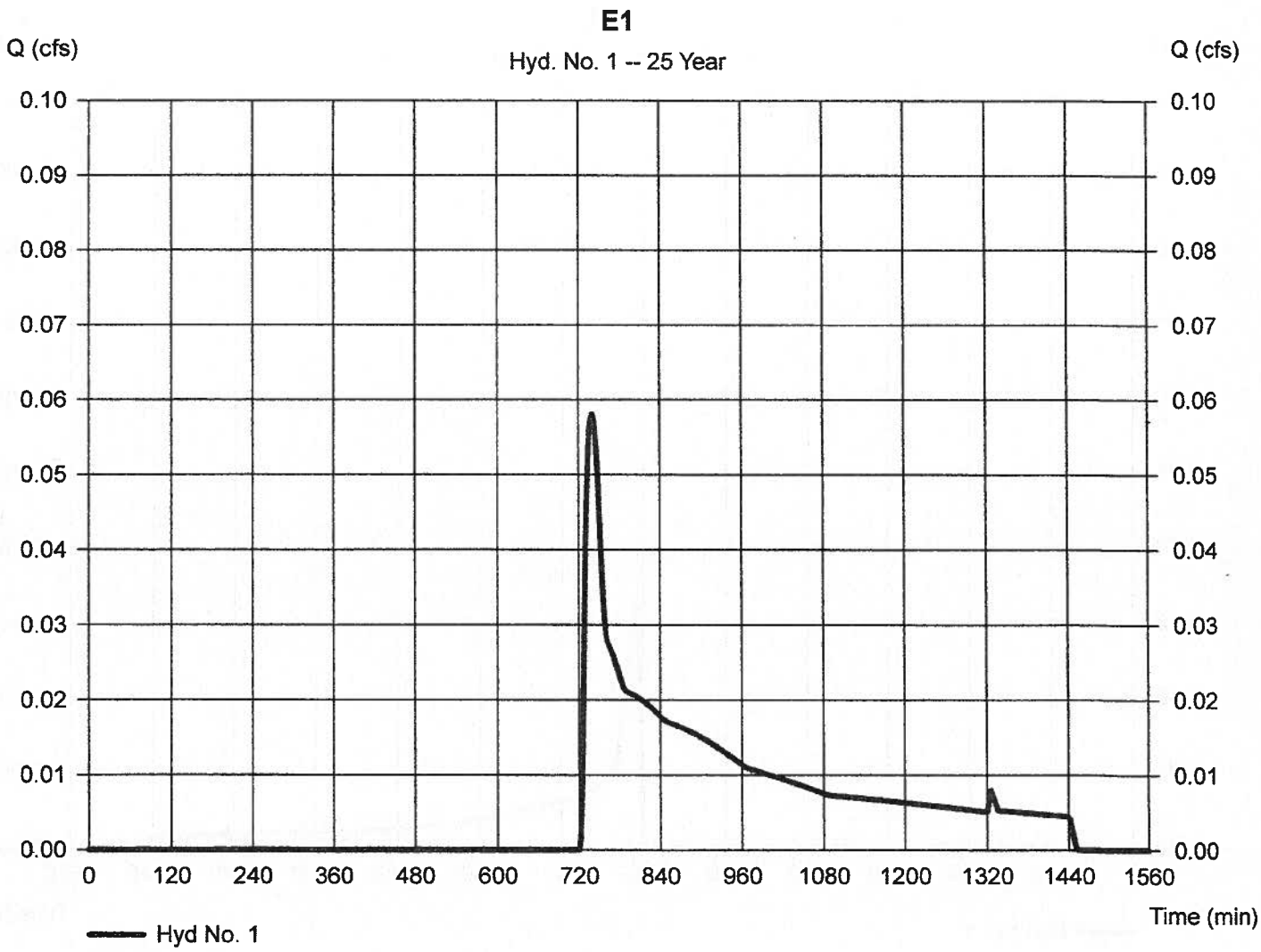
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.058 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 501 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



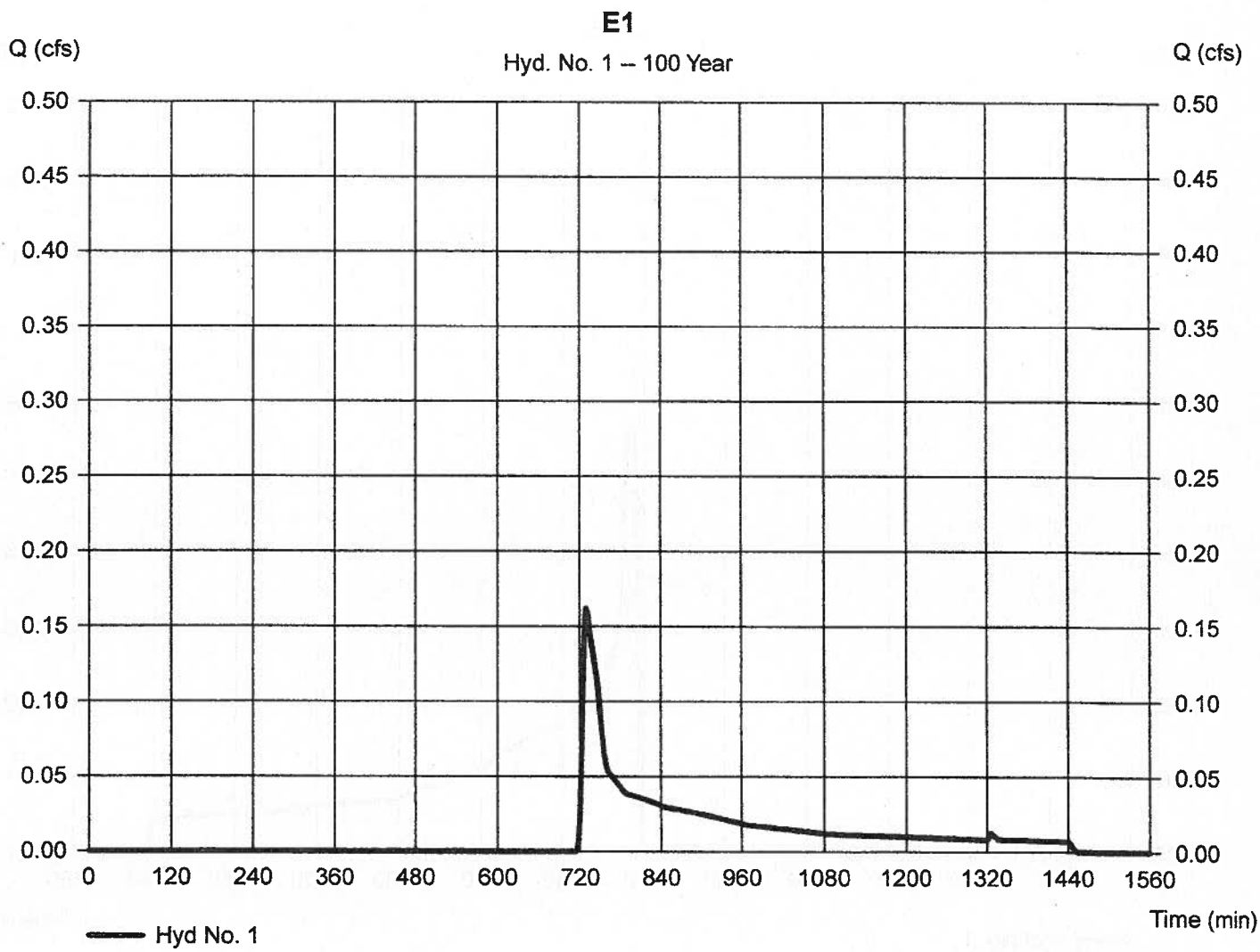
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.162 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 944 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed E2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.17	5.01
					Totals =	0.17	5.01

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{5.01}{0.17} = 30.00$; Use CN = 30.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.9	6.9
Runoff, Q.....	in	0.11	0.00	0.12
(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)				
Runoff, Q.....	cf	68	1	73

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E2

Circle one: Tc Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.4			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.055			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14

Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	33			
9. Watercourse slope, s		ft/ft	0.068			
10. Average Velocity, V (figure 3-1)		ft/s	4.21			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.5

(210-VI-TR-55, Second Ed., June 1986)

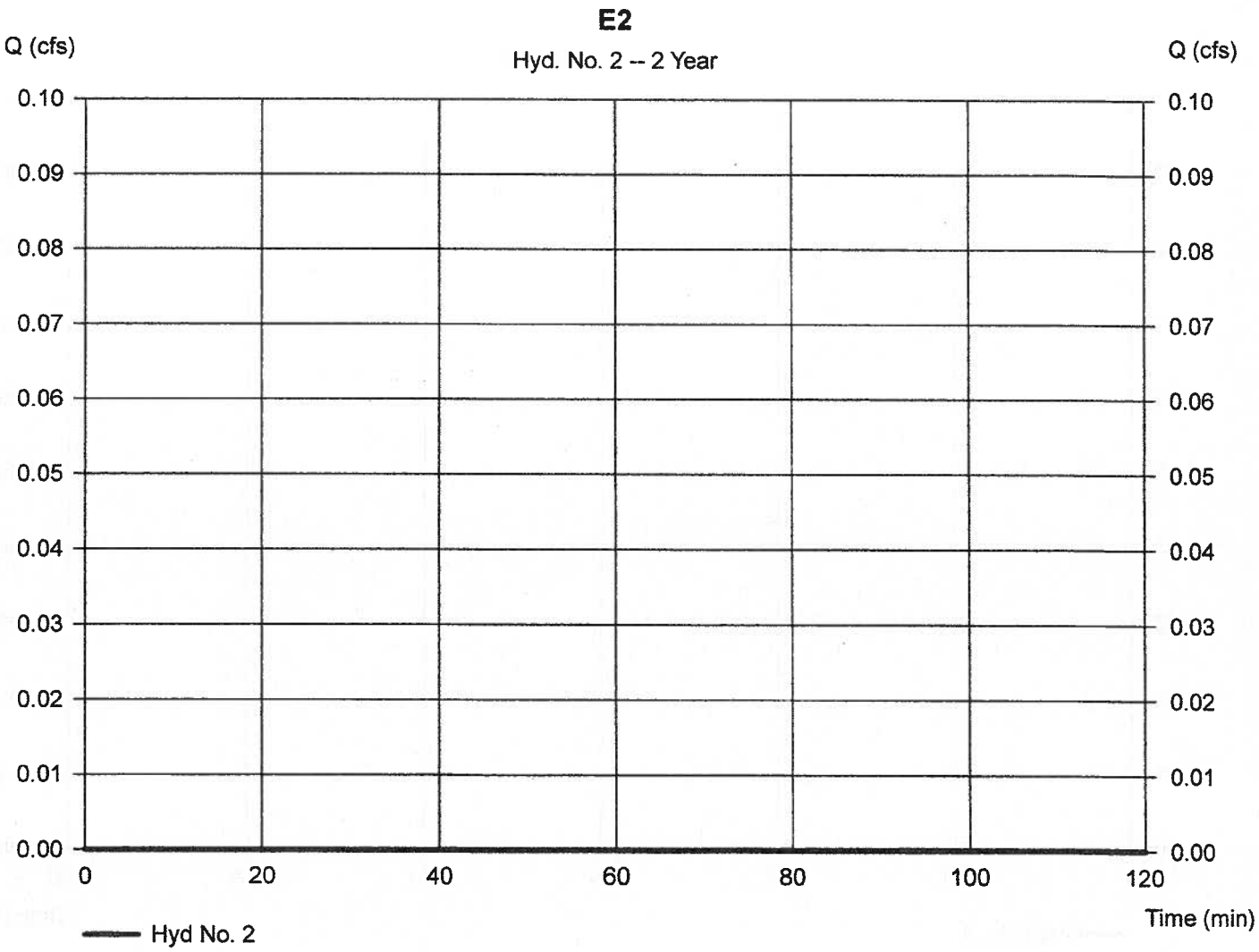
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



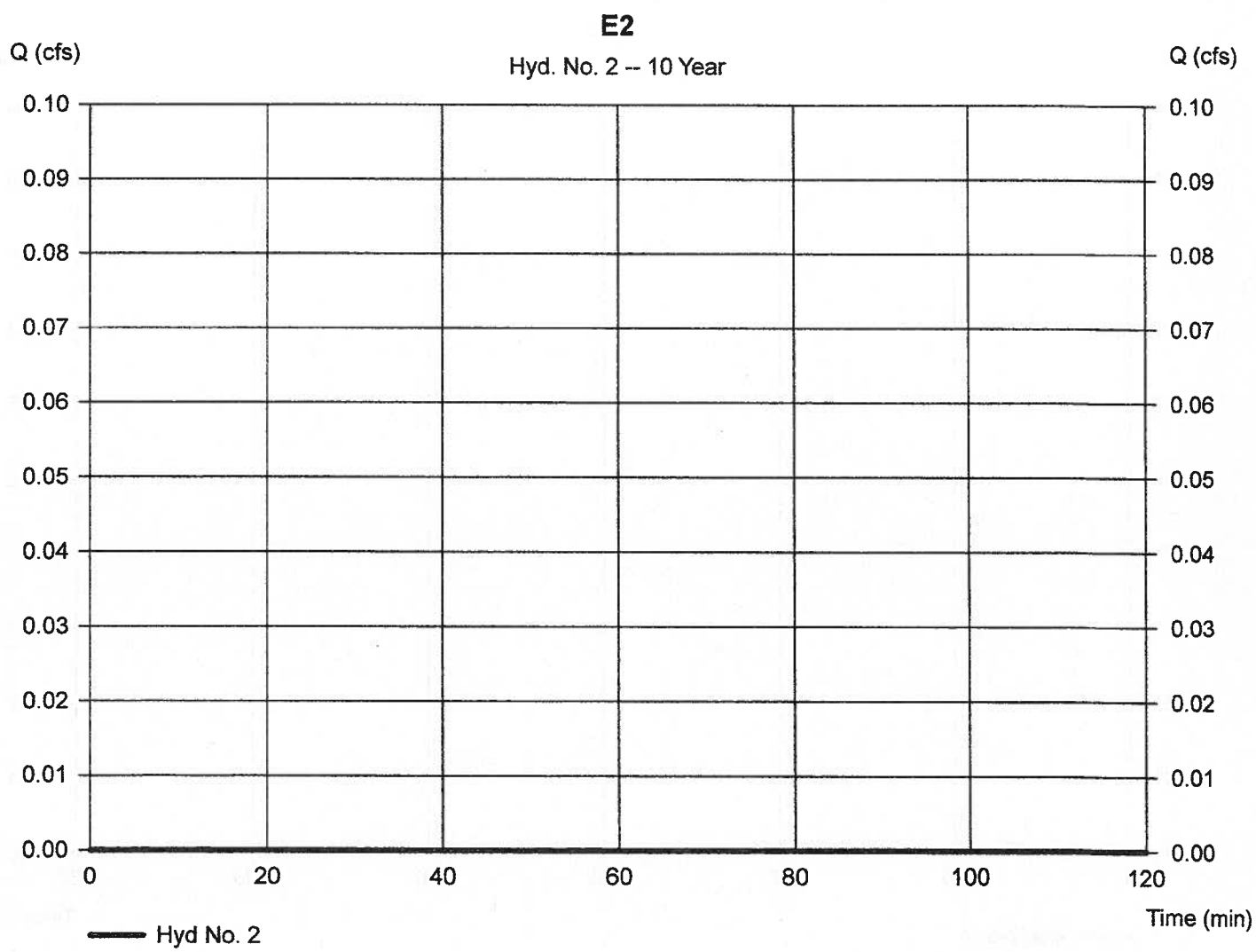
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



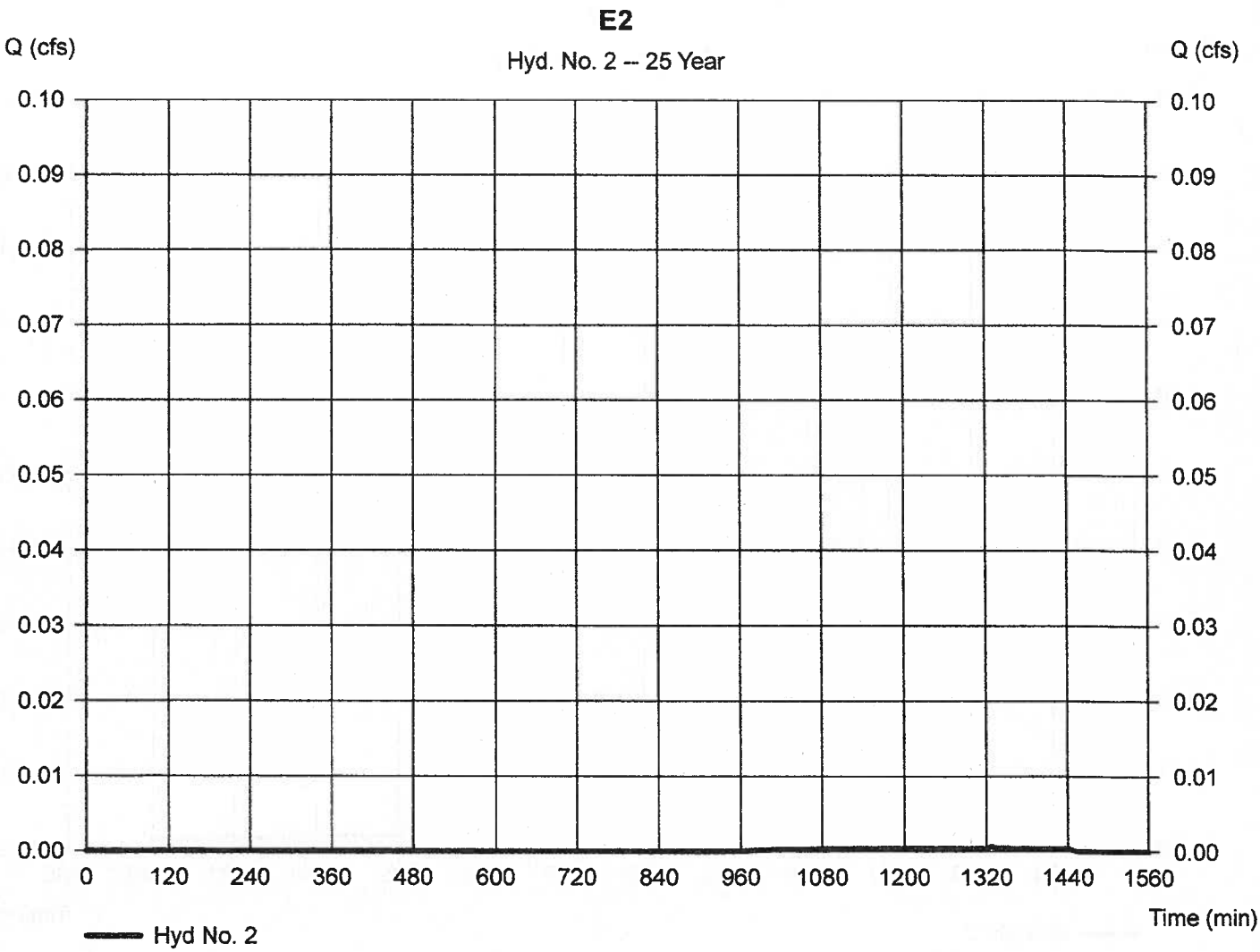
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 25 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 10 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



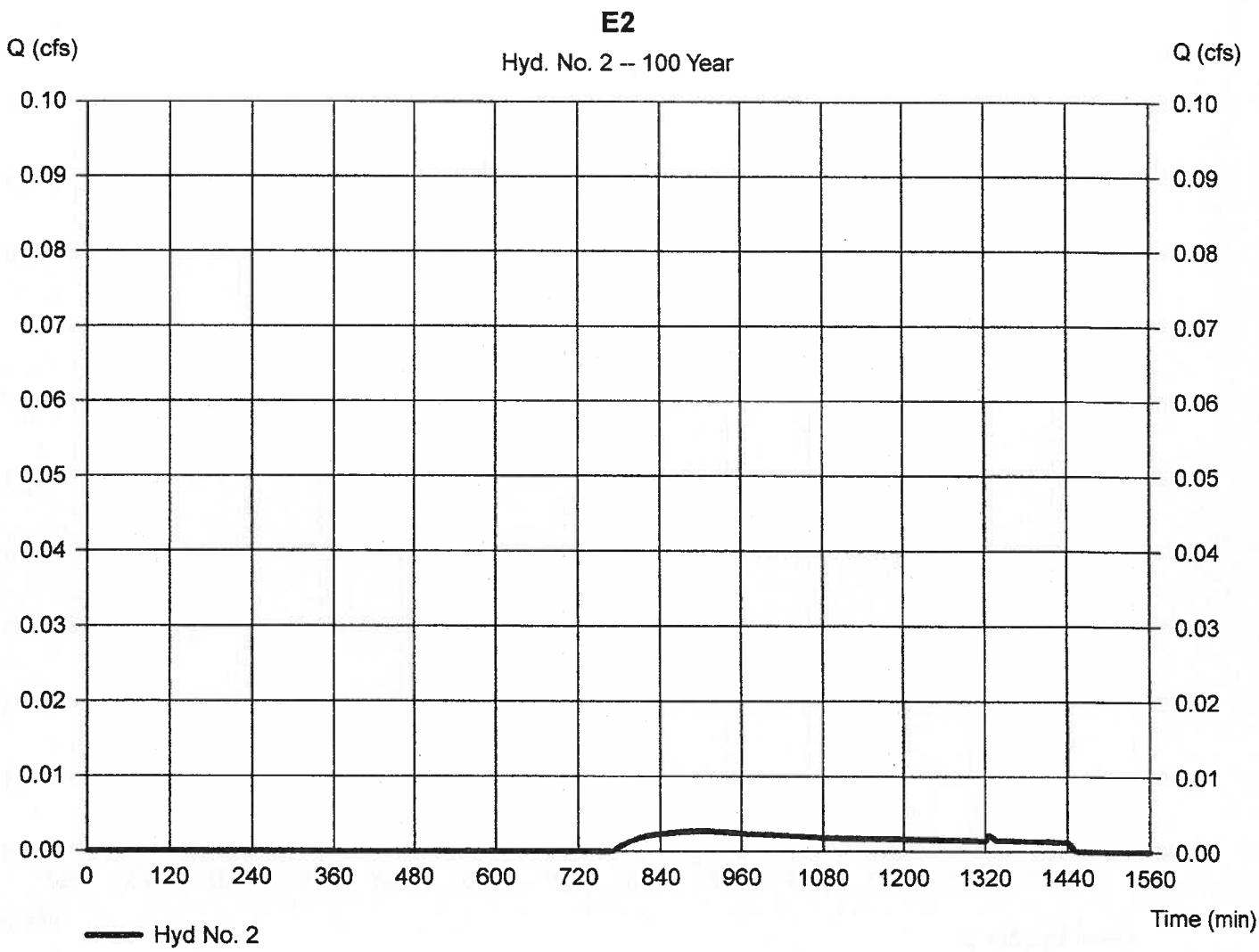
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 100 yrs	Time to peak	= 902 min
Time interval	= 2 min	Hyd. volume	= 74 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed E3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.77	23.13
A	Open	39			0.05	2.03
	Impervious	98			0.02	1.96
A	Gravel	76			0.02	1.37
	Totals =				0.86	28.49

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{28.49}{0.86} =$ 33.08 ; Use CN = 33.1

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.05	0.01	0.25
Runoff, Q.....	cf	145	31	768

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/2/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E3

Circle one: Tc Tt through subarea _____

		Segment ID	A-B			
Sheet flow (Applicable to Tc only)						
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.4			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.03			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
		Segment ID	B-C			
Shallow concentrated Flow						
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	81			
9. Watercourse slope, s		ft/ft	0.027			
10. Average Velocity, V (figure 3-1)		ft/s	2.65			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
		Segment ID				
Channel flow						
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19

min 11.2

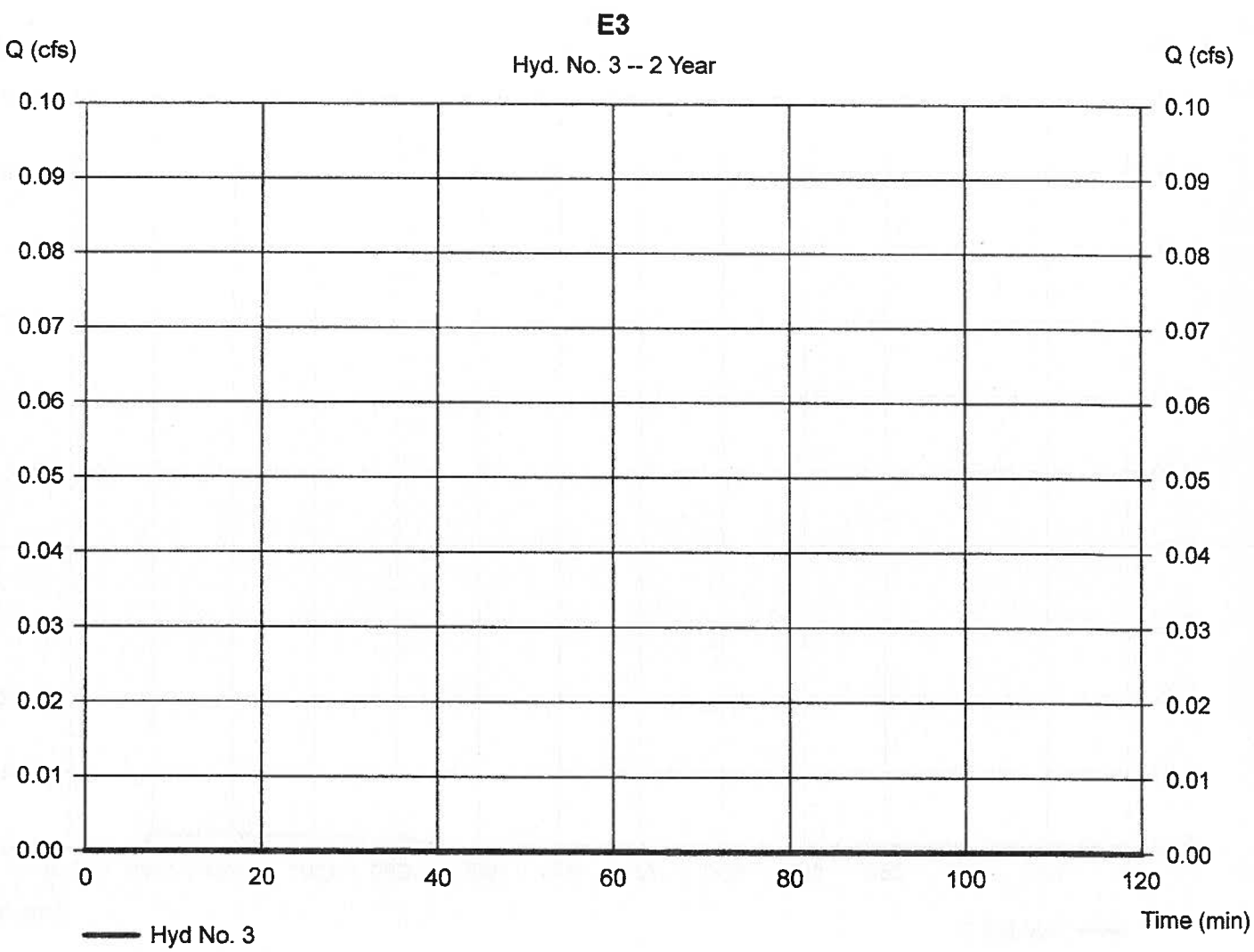
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



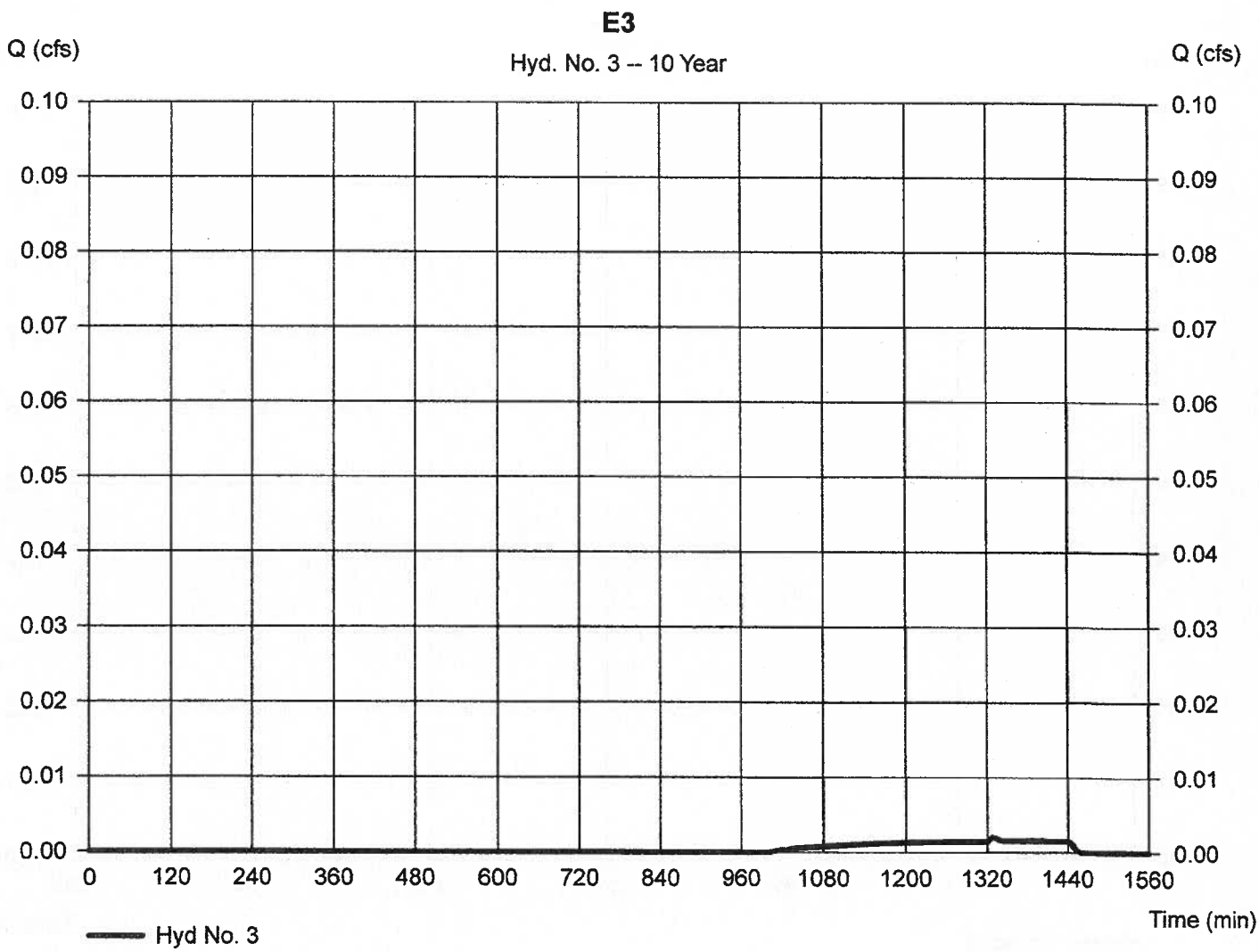
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 1328 min
Time interval	= 2 min	Hyd. volume	= 33 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



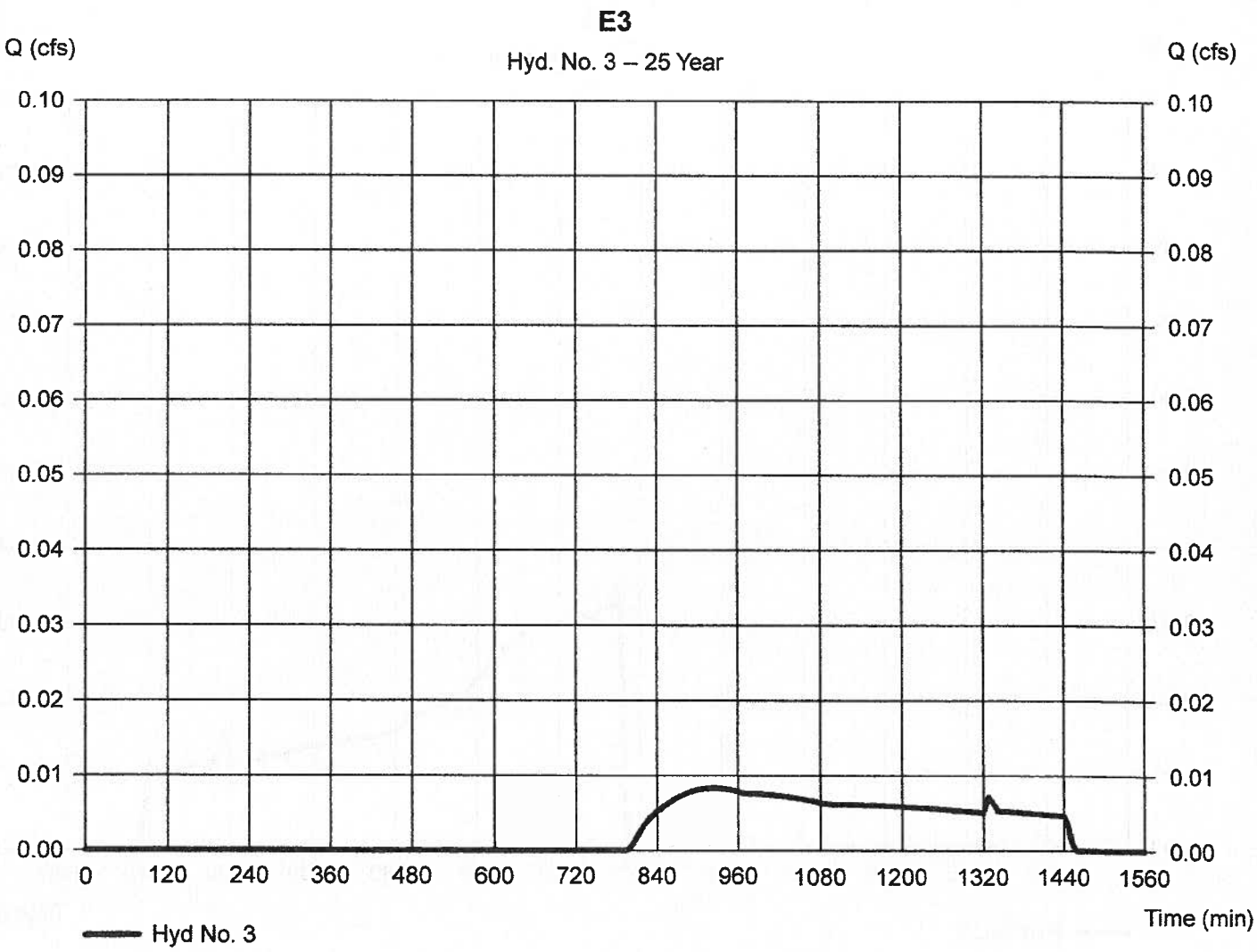
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 25 yrs	Time to peak	= 924 min
Time interval	= 2 min	Hyd. volume	= 237 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



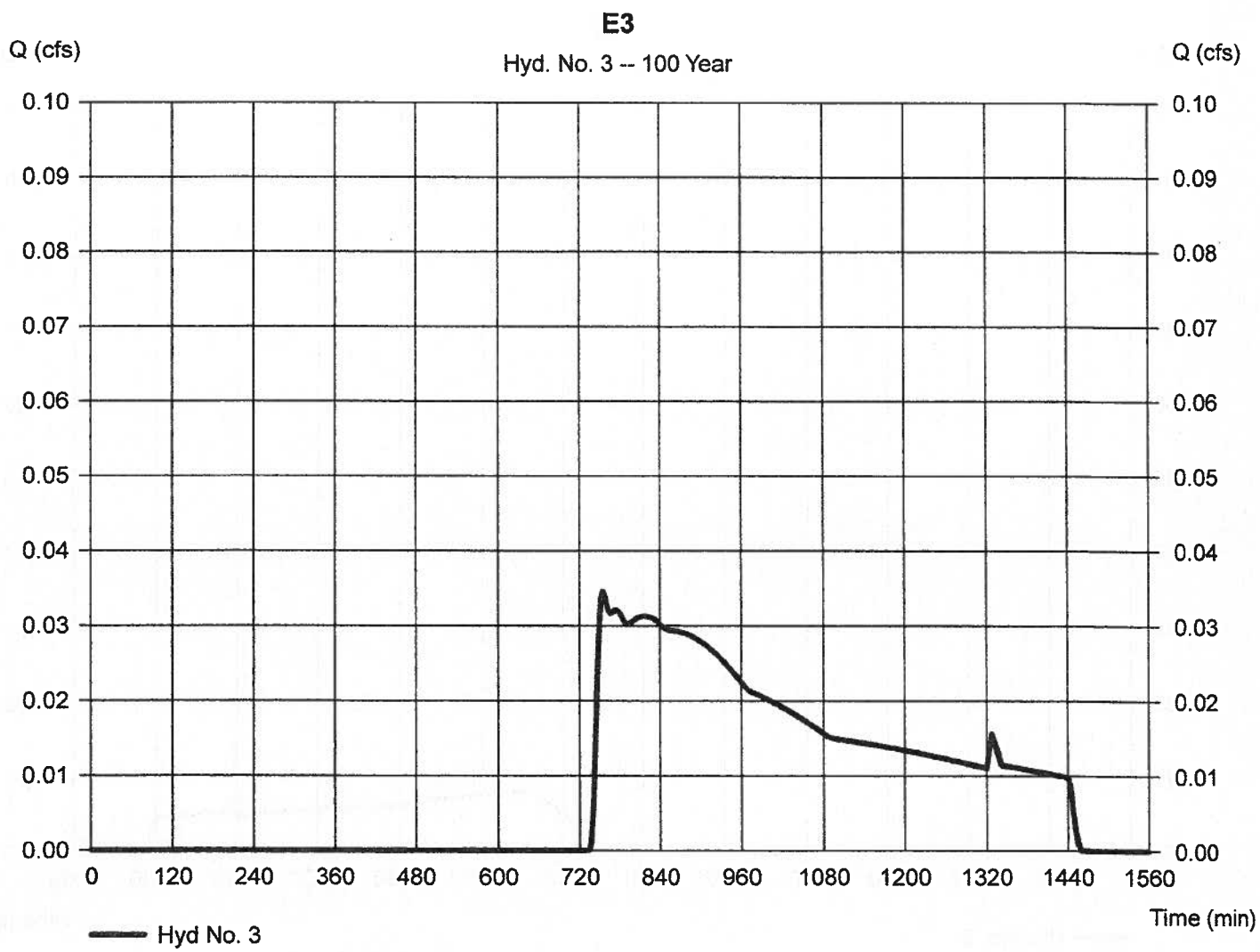
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 793 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed E4

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.53	15.96
A	Open	39			0.26	10.10
	Impervious	98			0.02	1.96
A	Gravel	76			0.09	6.46
	Totals =				0.90	34.48

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{34.48}{0.90} = 38.48$; Use CN = 38.5

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.00	0.10	0.53
Runoff, Q.....	cf	2	319	1739

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/2/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E4

Circle one: Tc Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.4			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.09			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.11			0.11
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	107			
9. Watercourse slope, s		ft/ft	0.037			
10. Average Velocity, V (figure 3-1)		ft/s	3.10			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.12

min 7.4

(210-VI-TR-55, Second Ed., June 1986)

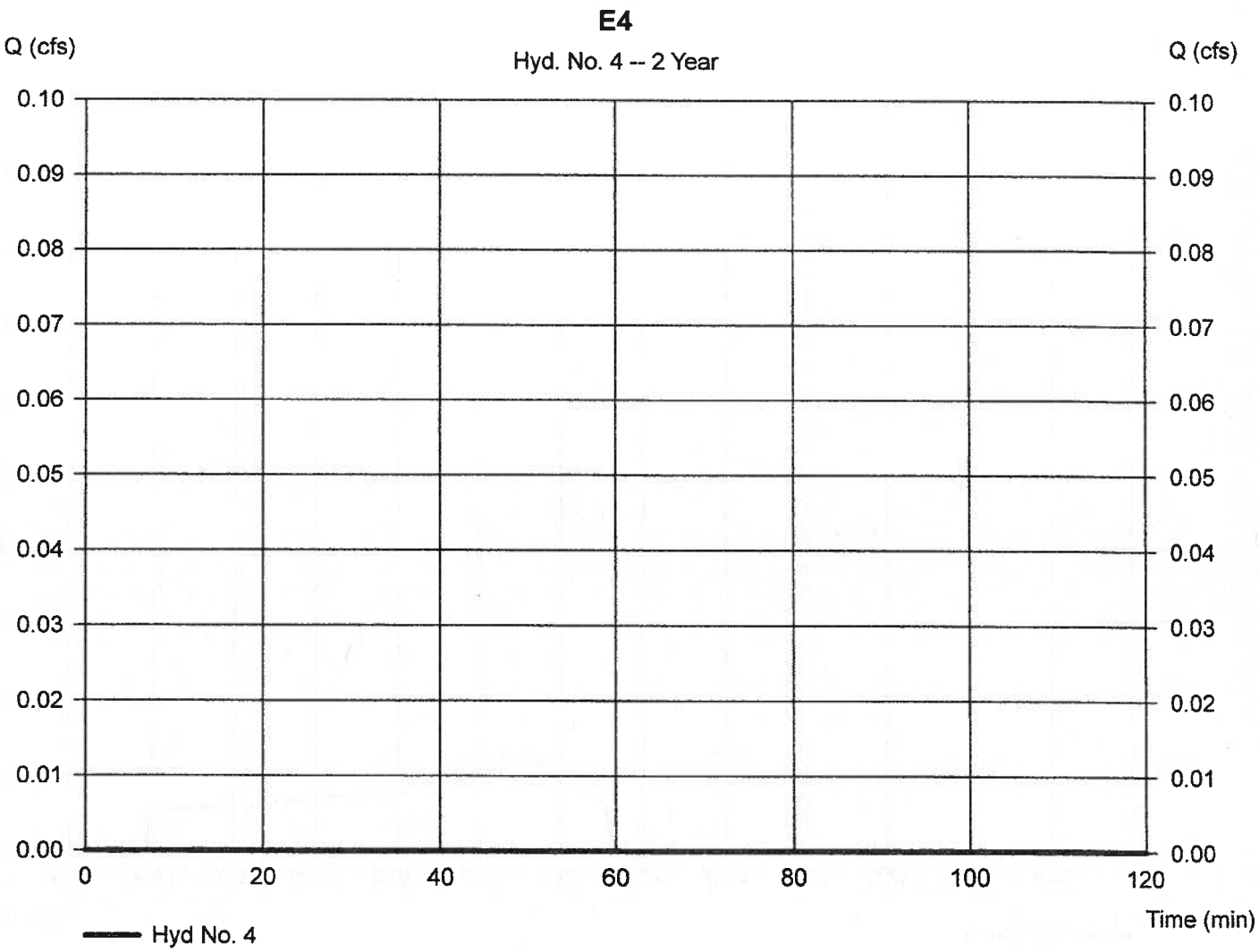
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



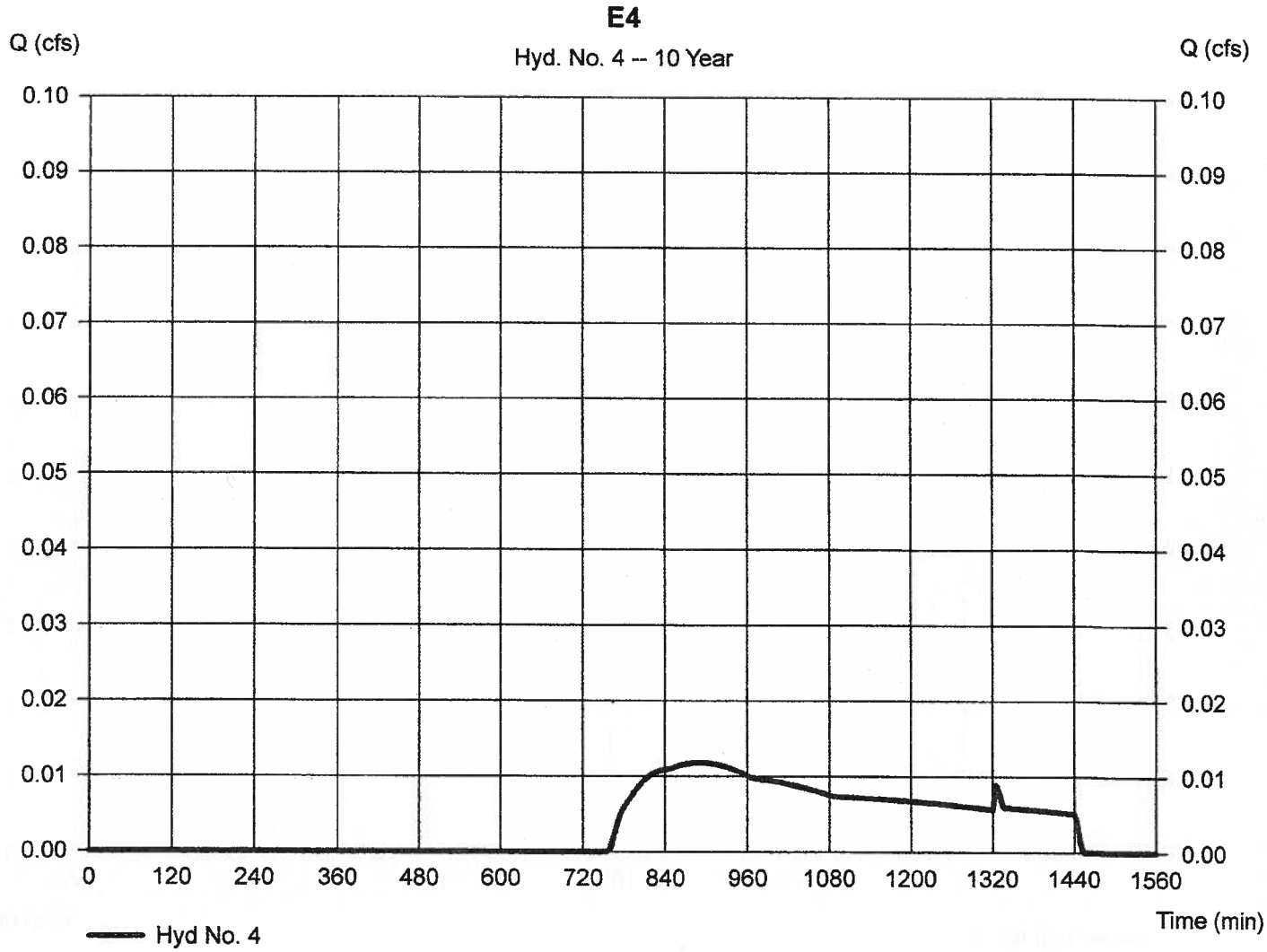
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 892 min
Time interval	= 2 min	Hyd. volume	= 322 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



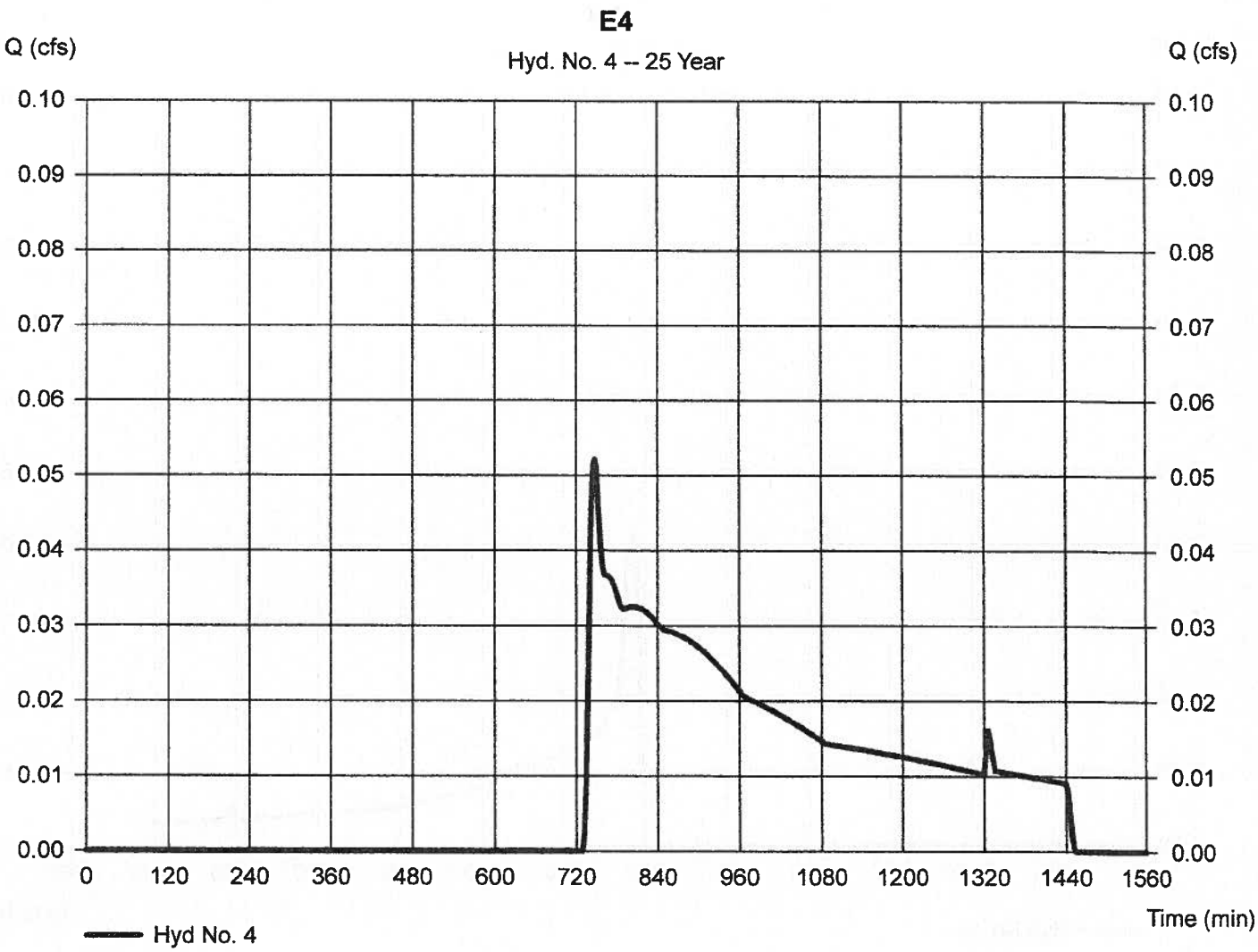
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.052 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 801 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



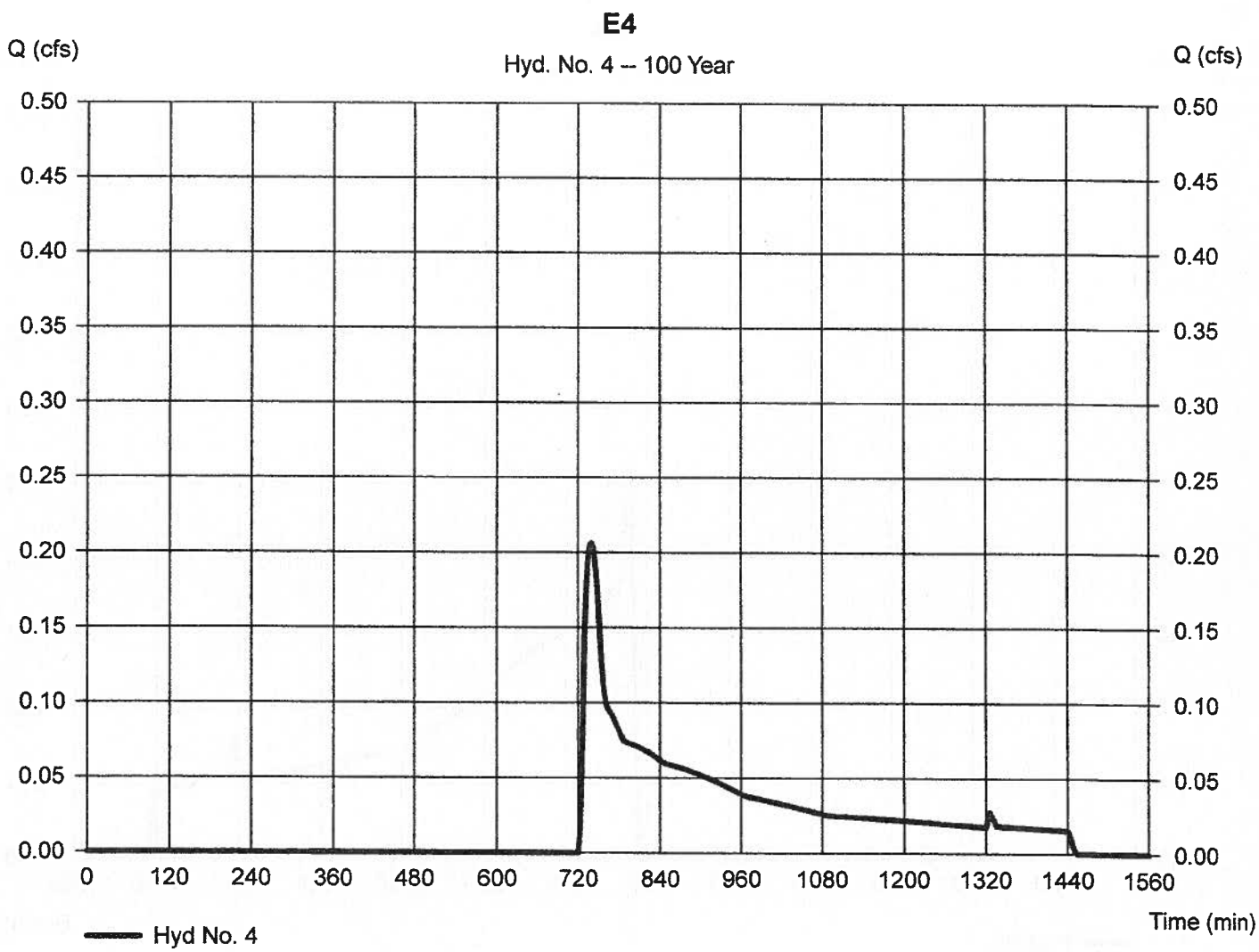
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.206 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 1,750 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

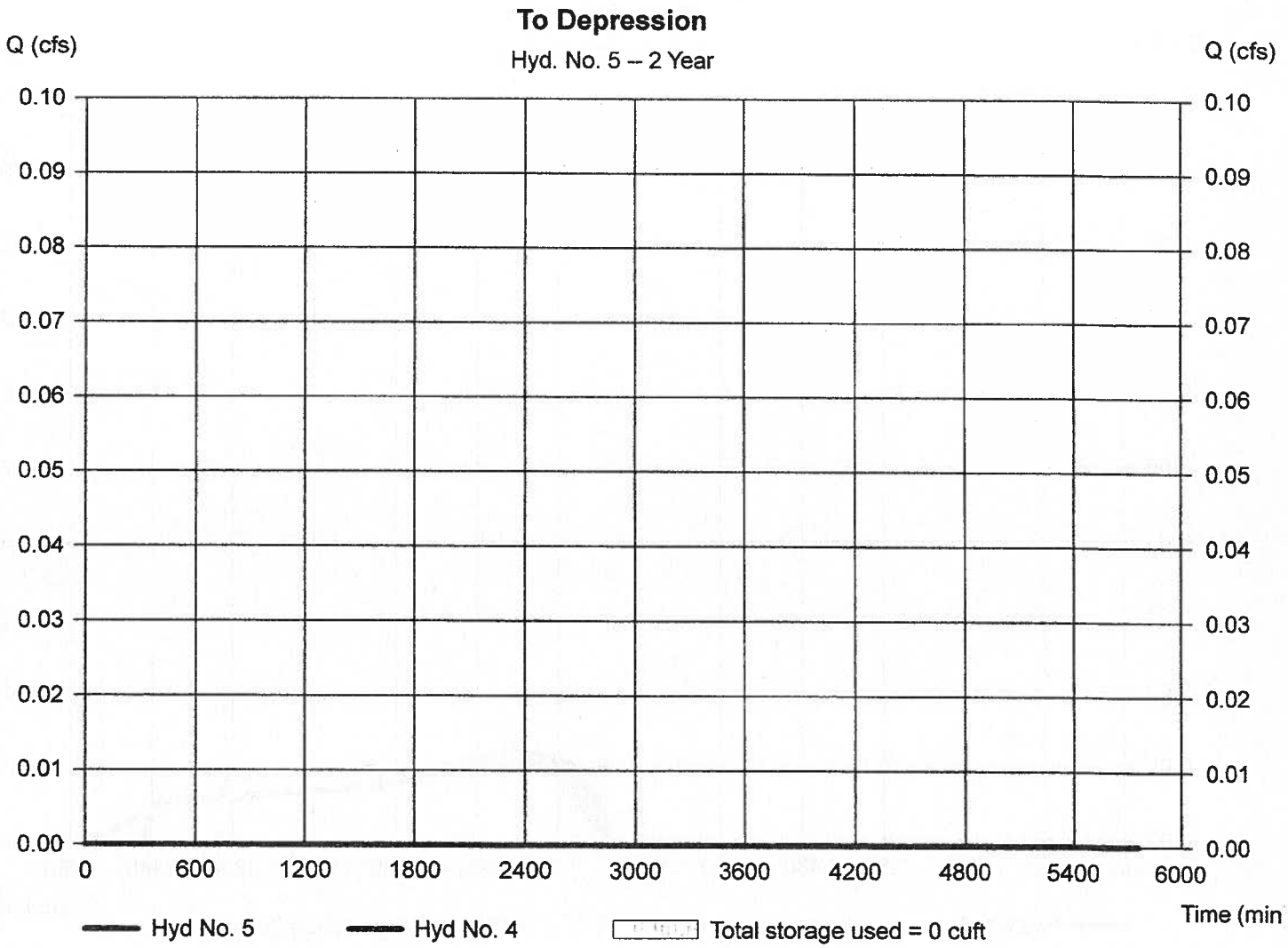
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.00 ft
Reservoir name	= On-site Depression	Max. Storage	= 0 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

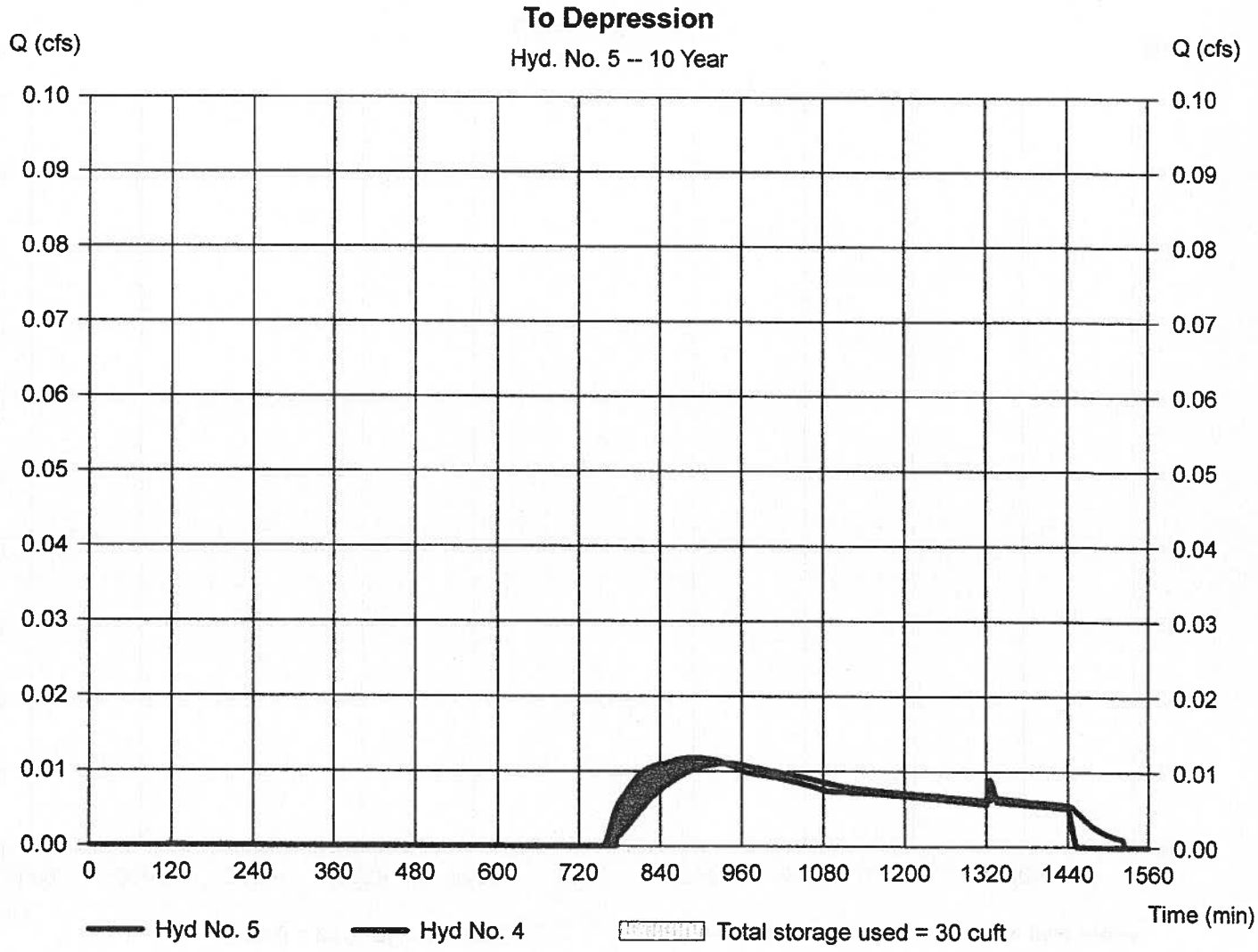
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.011 cfs
Storm frequency	= 10 yrs	Time to peak	= 936 min
Time interval	= 2 min	Hyd. volume	= 319 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.01 ft
Reservoir name	= On-site Depression	Max. Storage	= 30 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

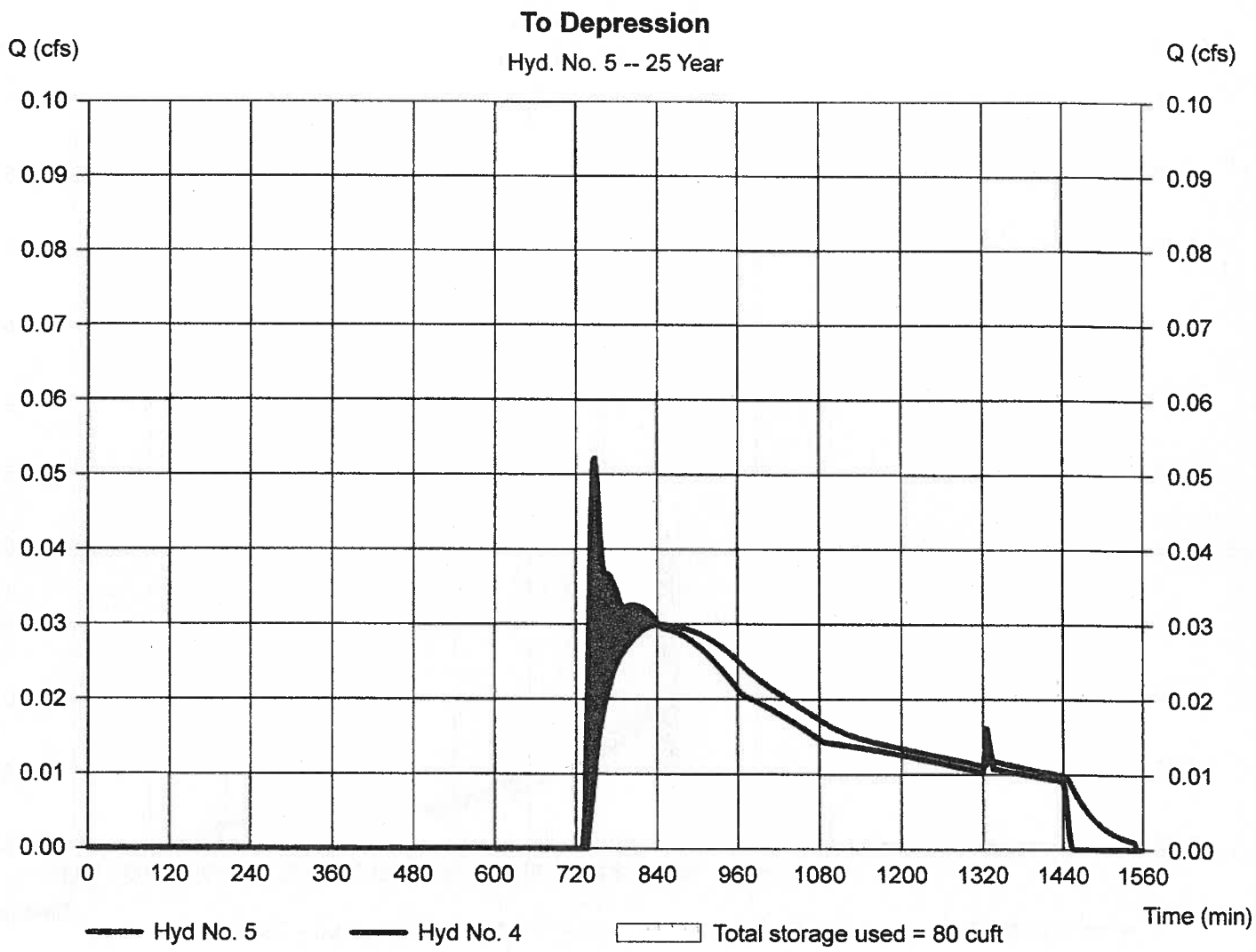
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.030 cfs
Storm frequency	= 25 yrs	Time to peak	= 842 min
Time interval	= 2 min	Hyd. volume	= 798 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.02 ft
Reservoir name	= On-site Depression	Max. Storage	= 80 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

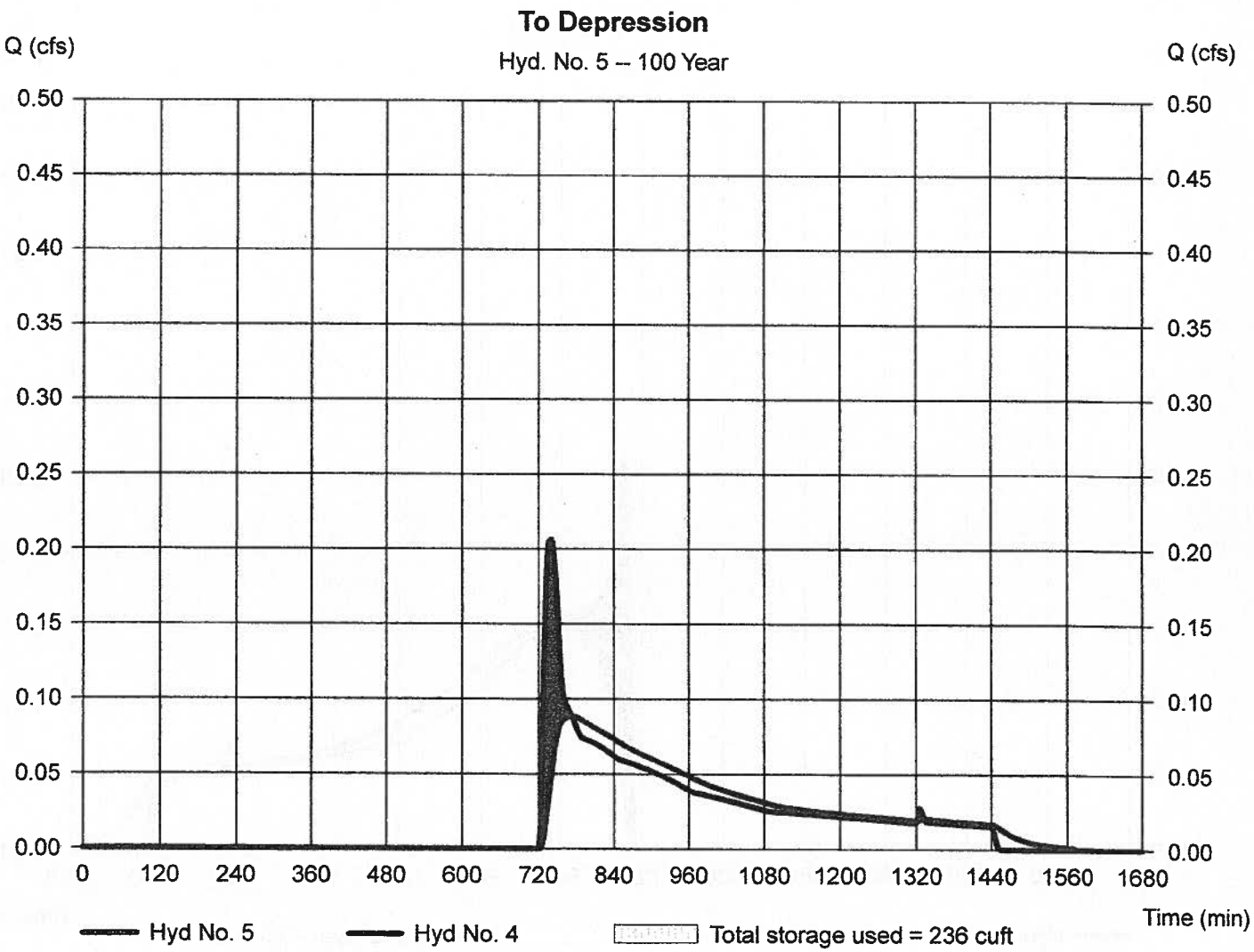
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 774 min
Time interval	= 2 min	Hyd. volume	= 1,747 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.05 ft
Reservoir name	= On-site Depression	Max. Storage	= 236 cuft

Storage Indication method used. Outflow includes exfiltration.



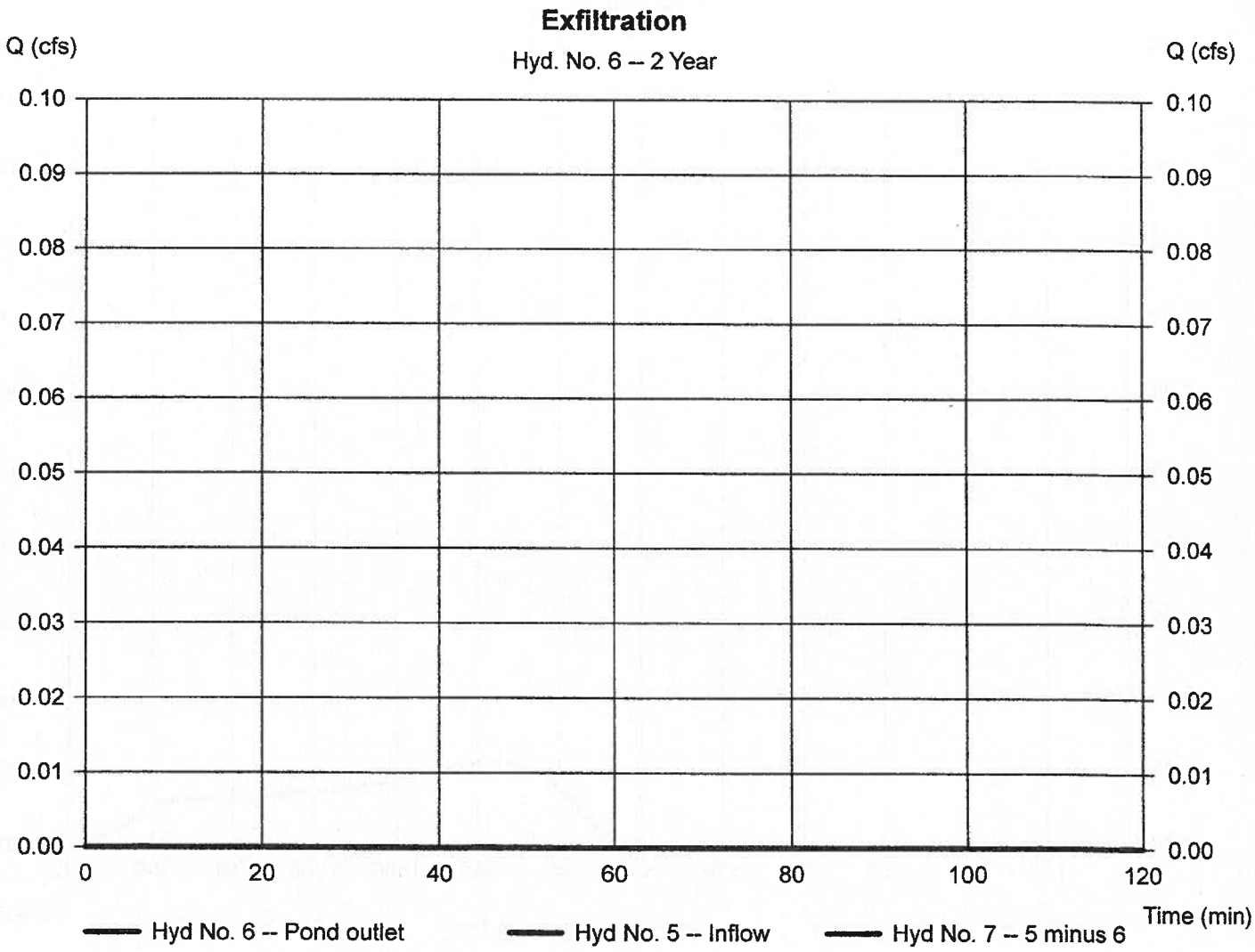
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



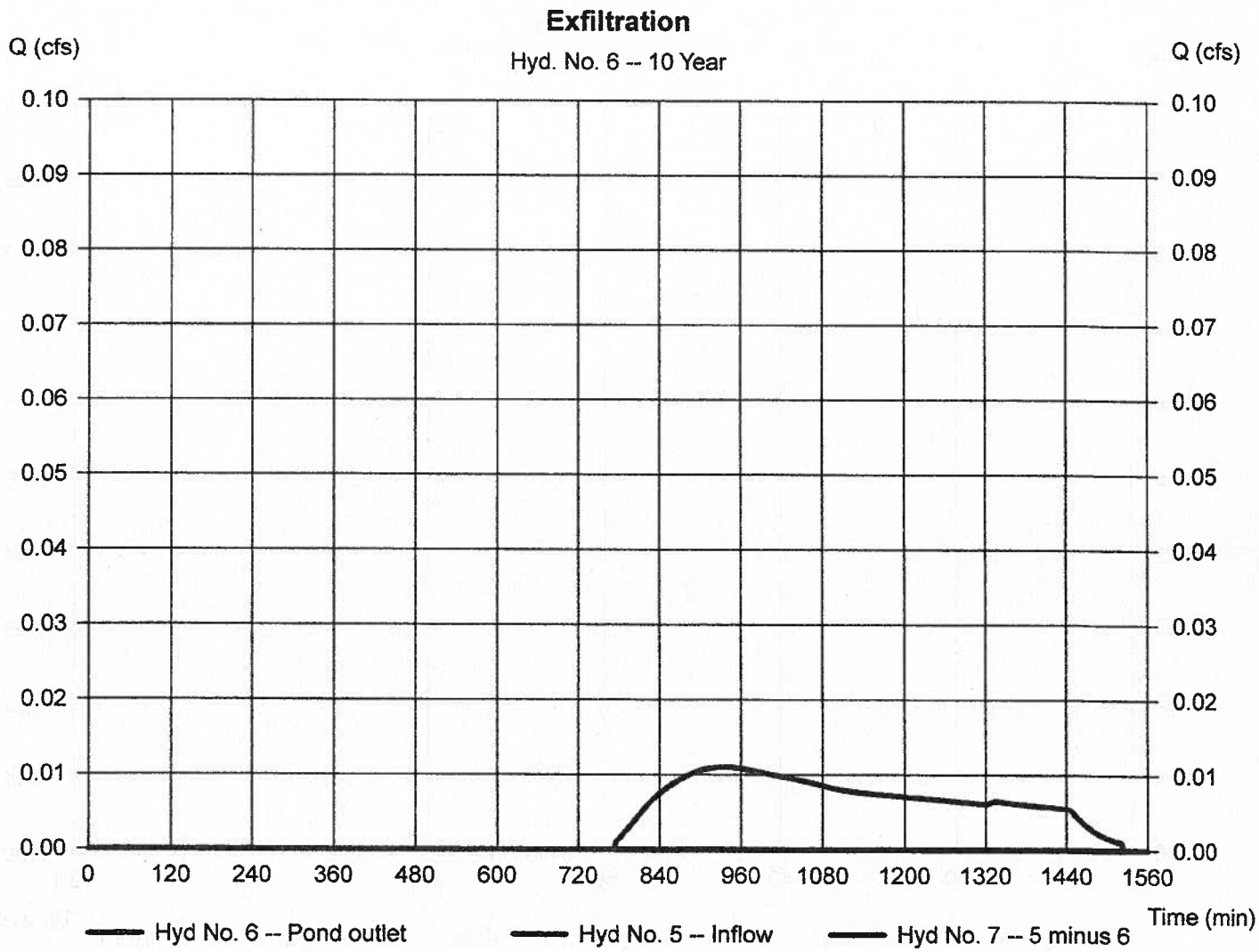
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.011 cfs
Storm frequency	= 10 yrs	Time to peak	= 936 min
Time interval	= 2 min	Hyd. volume	= 319 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 7
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



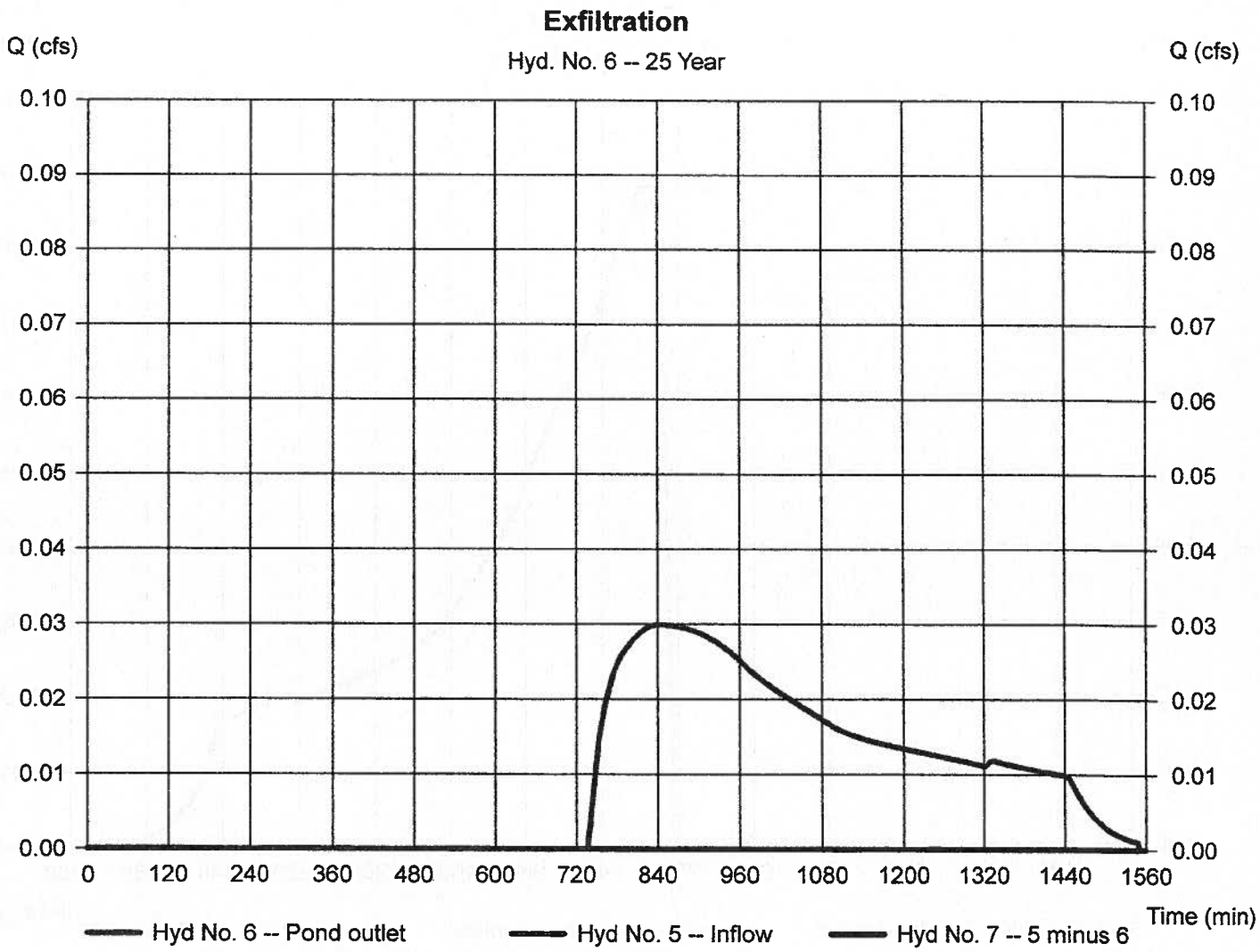
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.030 cfs
Storm frequency	=	25 yrs	Time to peak	=	842 min
Time interval	=	2 min	Hyd. volume	=	798 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



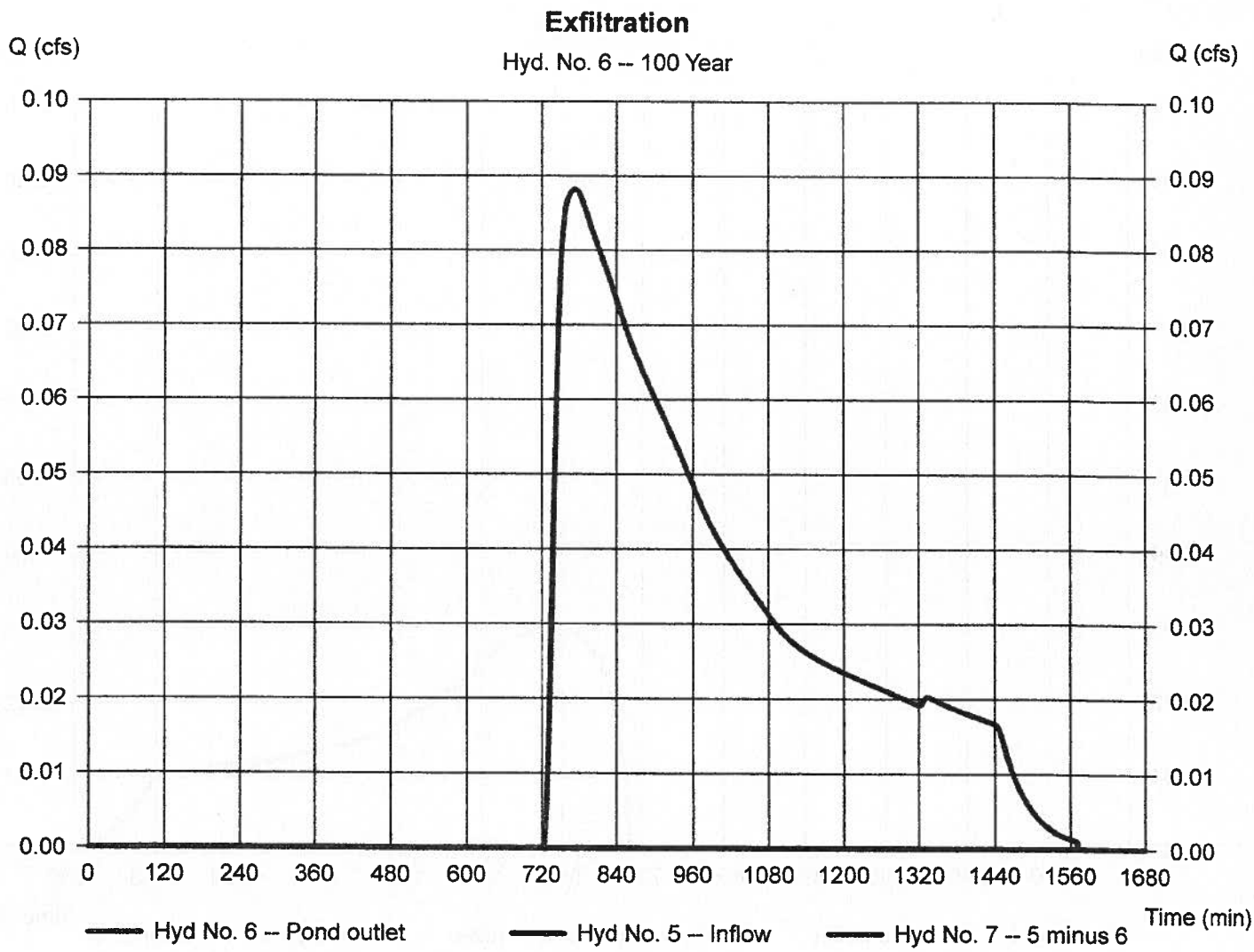
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 774 min
Time interval	= 2 min	Hyd. volume	= 1,747 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 7
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



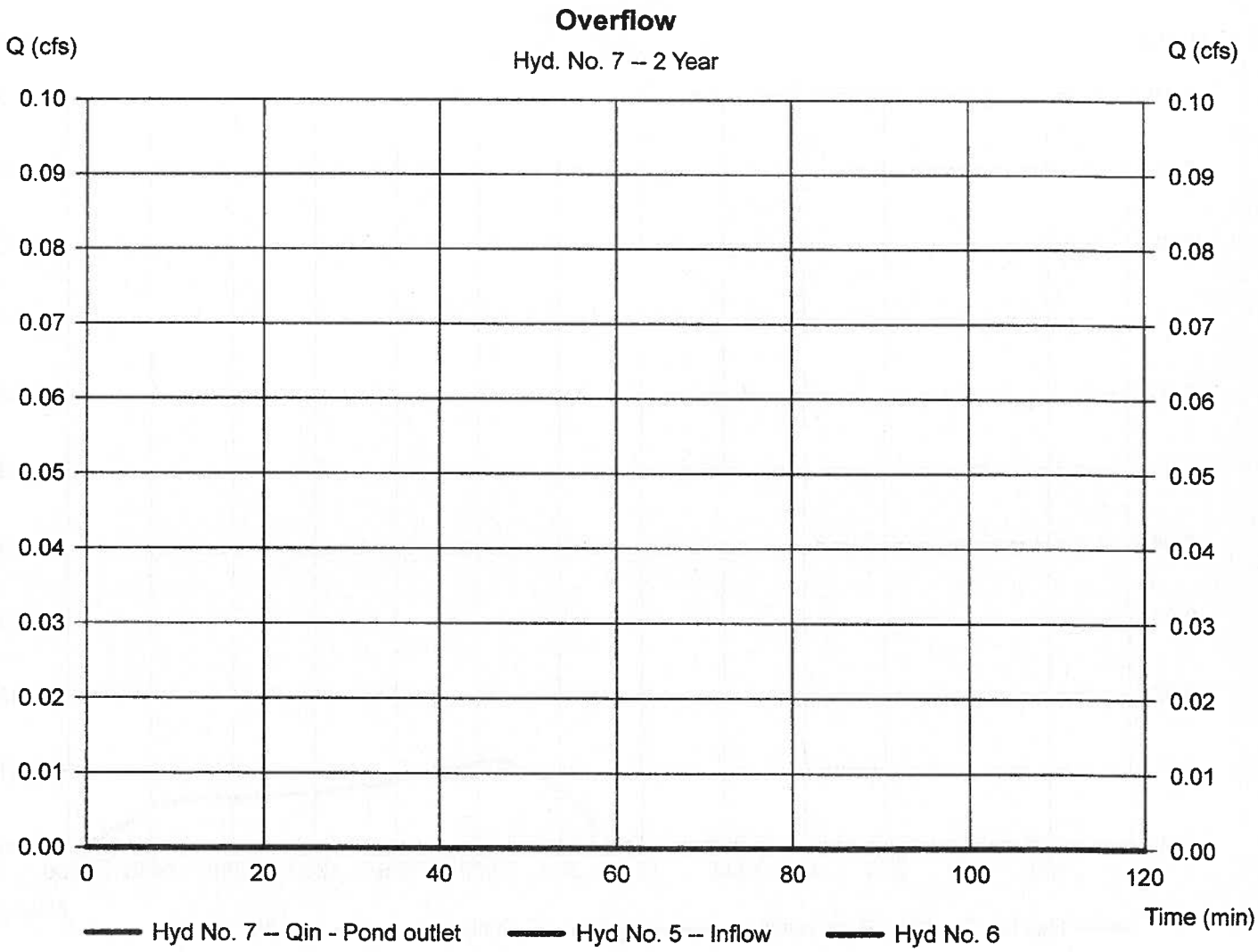
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 6
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



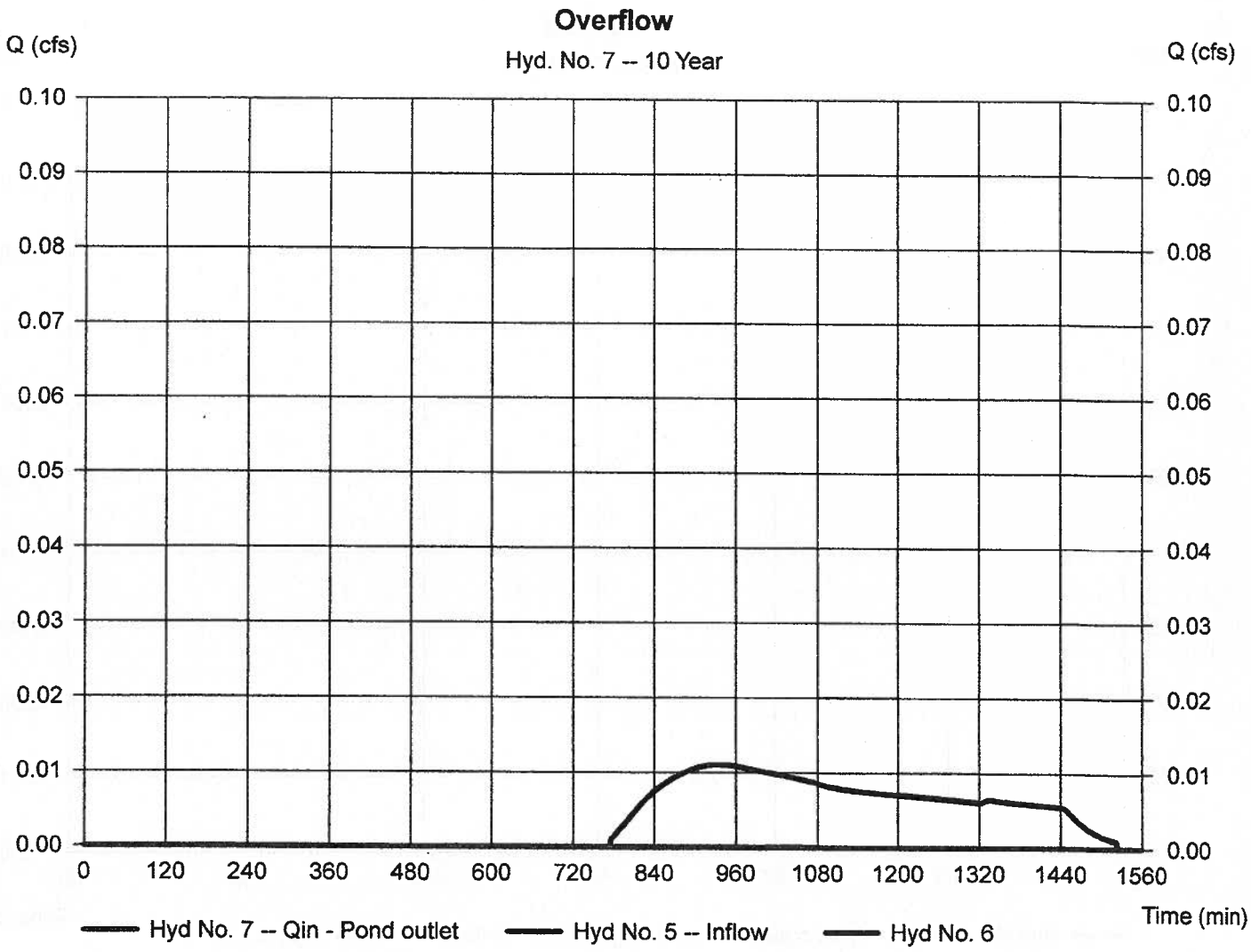
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 842 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 6
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



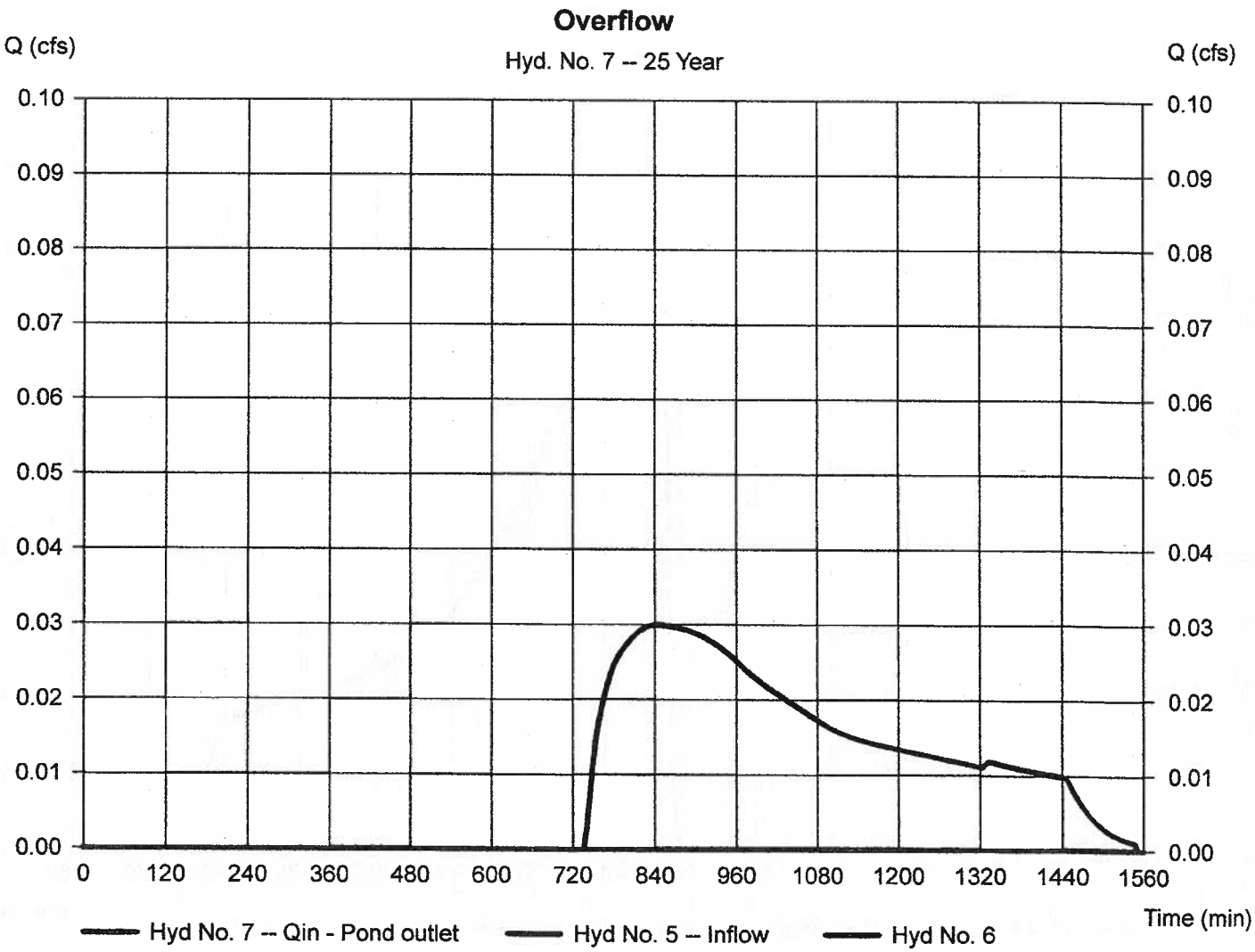
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 850 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 6
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



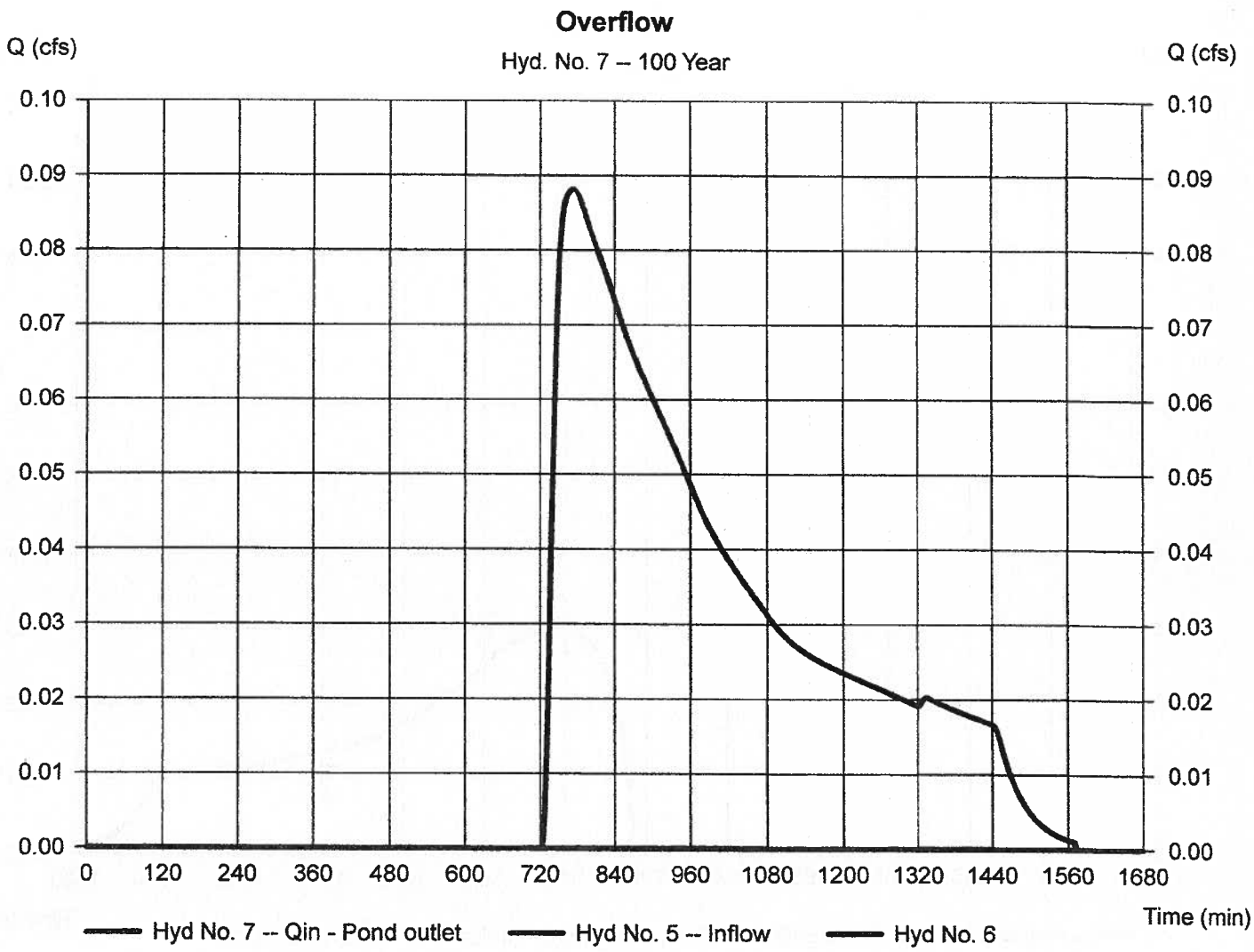
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 902 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - To Depression	2nd diverted hyd.	= 6
Diversion method	= Pond - On-site Depression	Pond structure	= Exfiltration



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Pond No. 1 - On-site Depression

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 156.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	156.00	1,499	0	0
1.00	157.00	9,950	5,103	5,103
2.00	158.00	14,090	11,959	17,062

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

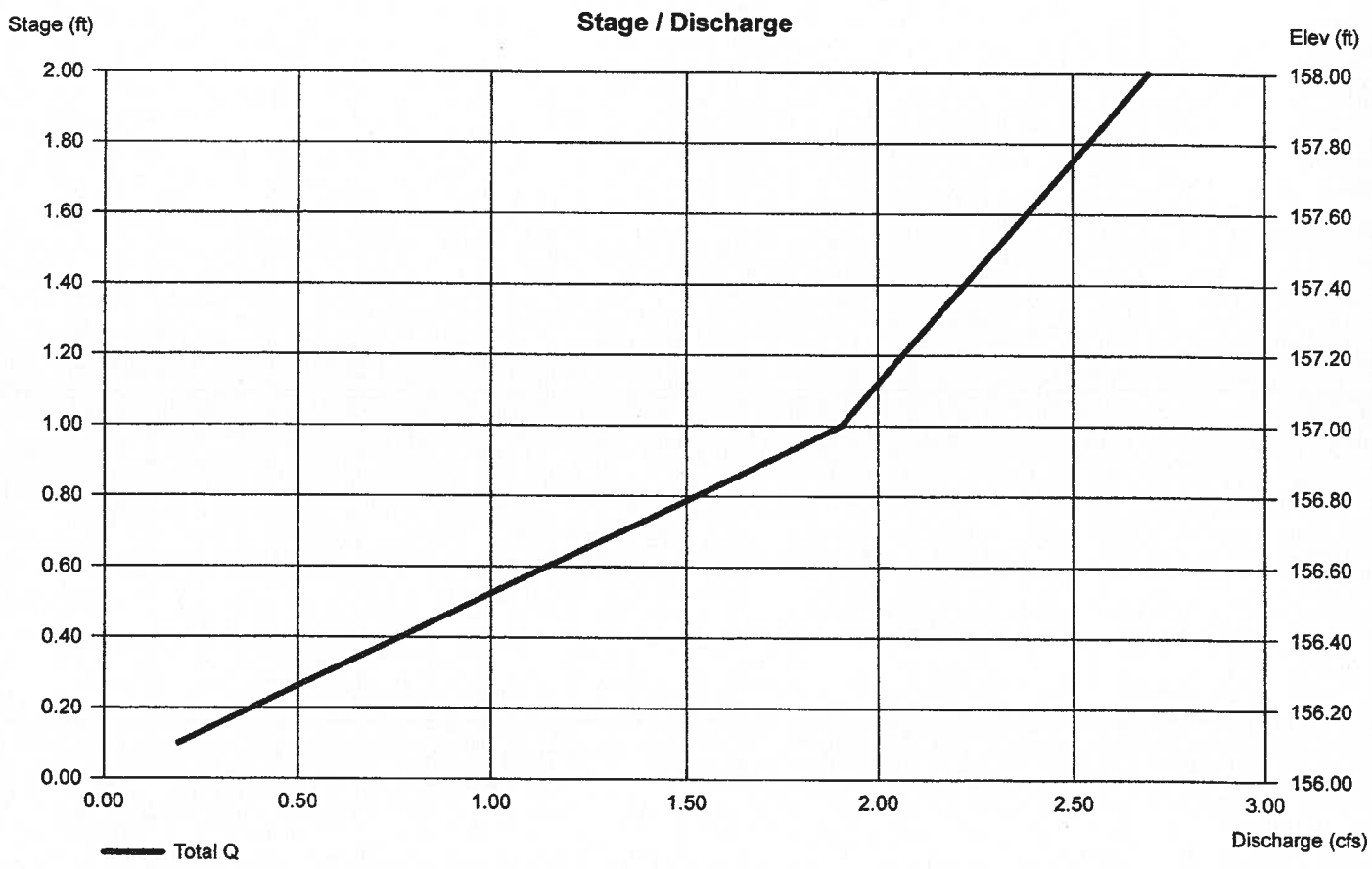
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Post-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.001	2	1326	8	---	-----	-----	P1
2	SCS Runoff	0.000	2	n/a	0	---	-----	-----	P2
3	SCS Runoff	0.000	2	n/a	0	---	-----	-----	P3
4	SCS Runoff	0.219	2	726	1,179	---	-----	-----	P4
5	Reservoir	0.211	2	728	1,179	4	153.04	17.4	Infiltration Area
6	Diversion1	0.211	2	728	1,179	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	730	0	5	-----	-----	Overflow
8	SCS Runoff	0.232	2	724	781	---	-----	-----	Roof Runoff
9	Reservoir	0.056	2	746	781	8	154.27	172	Roof Infiltration
10	Diversion1	0.056	2	746	781	9	-----	-----	Exfiltration
11	Diversion2	0.000	2	926	0	9	-----	-----	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.012	2	748	208	---	-----	-----	P1
2	SCS Runoff	0.000	2	n/a	0	---	-----	-----	P2
3	SCS Runoff	0.000	2	n/a	0	---	-----	-----	P3
4	SCS Runoff	0.923	2	724	3,230	---	-----	-----	P4
5	Reservoir	0.305	2	748	3,230	4	153.75	530	Infiltration Area
6	Diversion1	0.305	2	748	3,230	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	824	0	5	-----	-----	Overflow
8	SCS Runoff	0.339	2	724	1,161	---	-----	-----	Roof Runoff
9	Reservoir	0.067	2	748	1,161	8	155.06	301	Roof Infiltration
10	Diversion1	0.067	2	748	1,161	9	-----	-----	Exfiltration
11	Diversion2	0.000	2	598	0	9	-----	-----	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.046	2	742	424	----	------	------	P1
2	SCS Runoff	0.001	2	1326	10	----	------	------	P2
3	SCS Runoff	0.003	2	1328	64	----	------	------	P3
4	SCS Runoff	1.436	2	724	4,678	----	------	------	P4
5	Reservoir	0.349	2	750	4,678	4	154.24	1,053	Infiltration Area
6	Diversion1	0.349	2	750	4,678	5	------	------	Exfiltration
7	Diversion2	0.000	2	708	0	5	------	------	Overflow
8	SCS Runoff	0.400	2	724	1,378	----	------	------	Roof Runoff
9	Reservoir	0.075	2	748	1,378	8	155.60	377	Roof Infiltration
10	Diversion1	0.075	2	748	1,378	9	------	------	Exfiltration
11	Diversion2	0.000	2	556	0	9	------	------	Overflow

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.130	2	732	819	---	-----	-----	P1
2	SCS Runoff	0.003	2	902	74	---	-----	-----	P2
3	SCS Runoff	0.014	2	896	392	---	-----	-----	P3
4	SCS Runoff	2.219	2	724	6,906	---	-----	-----	P4
5	Reservoir	0.427	2	752	6,906	4	155.10	1,933	Infiltration Area
6	Diversion1	0.427	2	752	6,906	5	-----	-----	Exfiltration
7	Diversion2	0.000	2	1080	0	5	-----	-----	Overflow
8	SCS Runoff	0.484	2	724	1,677	---	-----	-----	Roof Runoff
9	Reservoir	0.091	2	748	1,677	8	156.73	481	Roof Infiltration
10	Diversion1	0.091	2	748	1,677	9	-----	-----	Exfiltration
11	Diversion2	0.000	2	640	0	9	-----	-----	Overflow

Worksheet 2: Runoff curve number and runoff SM-4860

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.13	3.87
A	Open	39			0.12	4.80
	Impervious	98			0.02	1.86
A	Gravel	76			0.02	1.82
					Totals =	0.30	12.35

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{12.35}{0.30} = 41.87$; Use CN = 41.9

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	2.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.01	0.19	0.75
Runoff, Q.....	cf	8	204	803

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed

Circle one: Tc | Tt through subarea P1

		Segment ID	A-B	B-C		
Sheet flow (Applicable to Tc only)						
1. Surface Description (table 3-1)			Woods	Grass		
2. Mannings roughness coeff., n (table 3-1)			0.4	0.24		
3. Flow length, L (total L <= 300 ft)		ft	9	41		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.027	0.04		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.05	0.09		0.14
Shallow concentrated Flow		Segment ID	C-D			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	25			
9. Watercourse slope, s		ft/ft	0.06			
10. Average Velocity, V (figure 3-1)		ft/s	3.95			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.3

(210-VI-TR-55, Second Ed., June 1986)

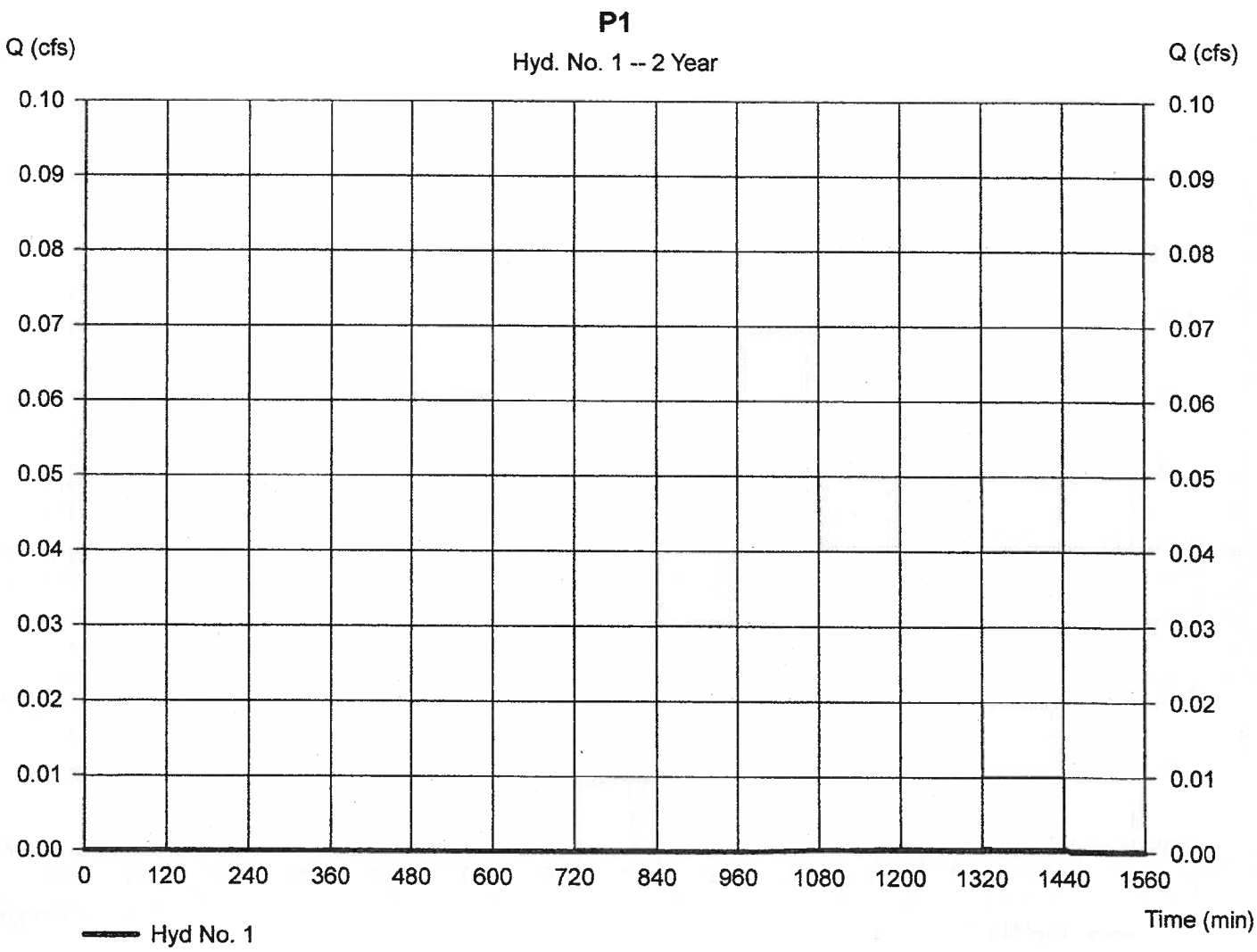
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 8 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



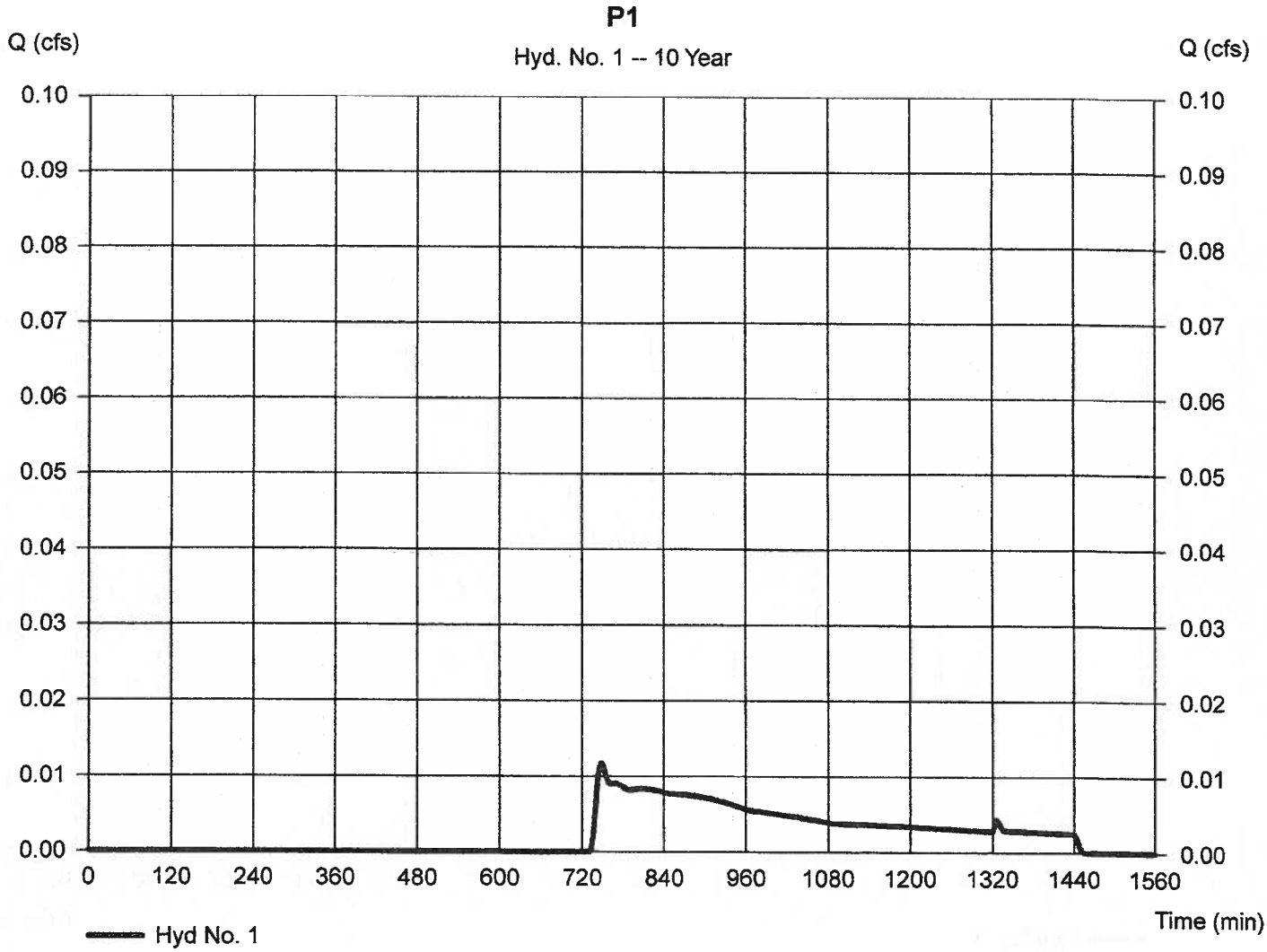
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 208 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



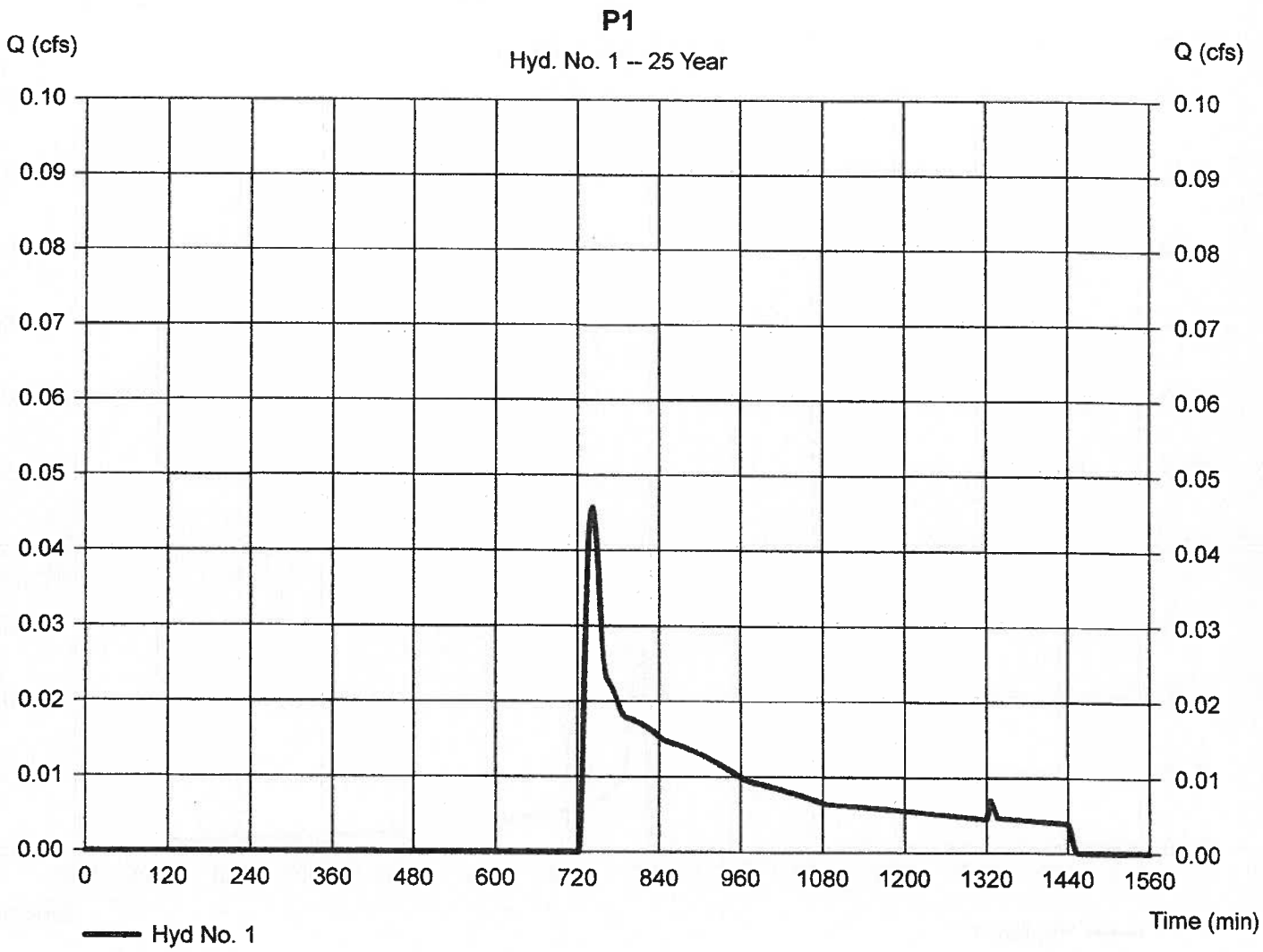
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.046 cfs
Storm frequency	= 25 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 424 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



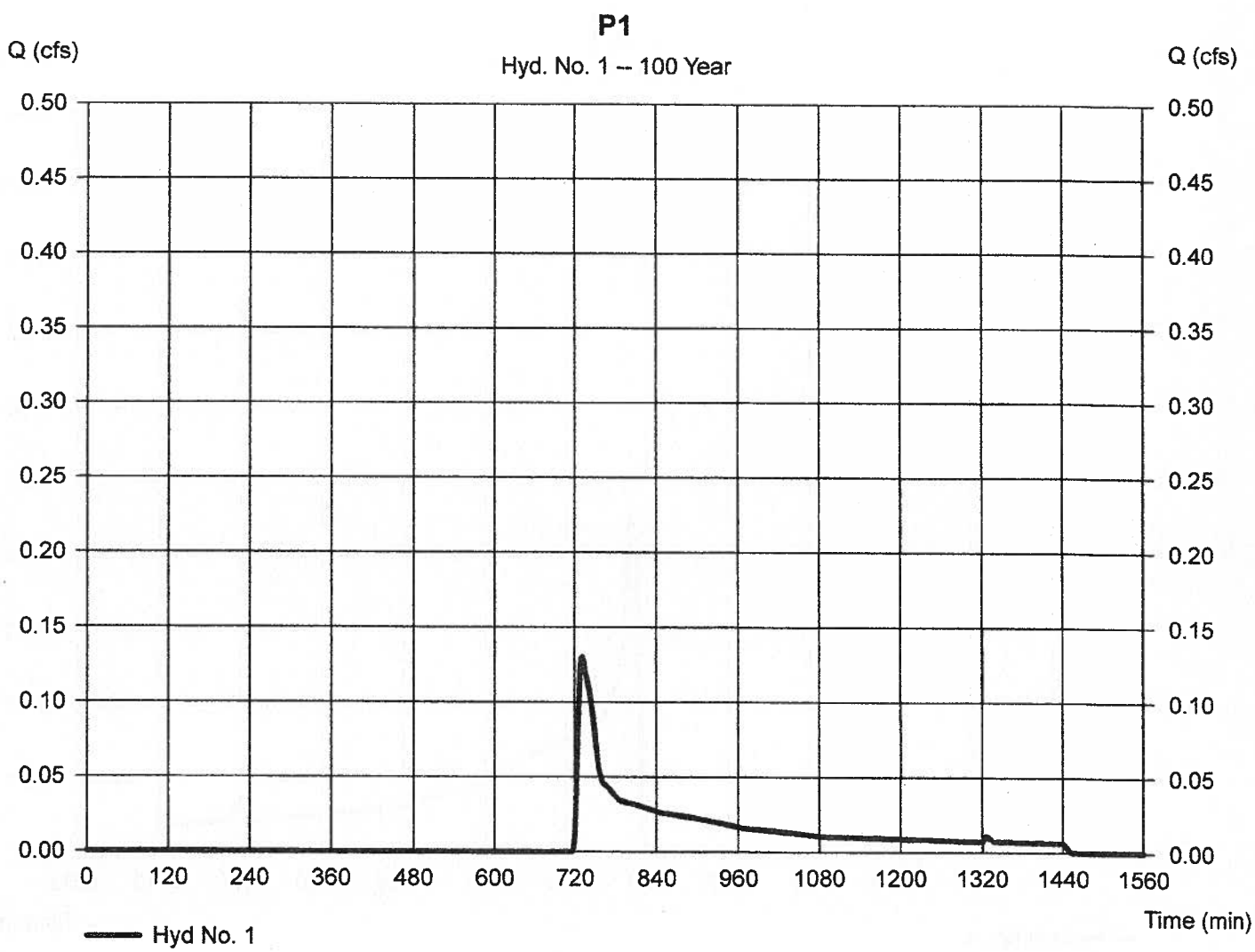
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.130 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 819 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.17	5.01
A	Open	39			0.00	0.00
	Impervious	98			0.00	0.00
A	Gravel	76			0.00	0.00
					Totals =	0.17	5.01

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{5.01}{0.17} = 30.00$; Use CN = 30.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.11	0.00	0.12
Runoff, Q.....	cf	68	1	73

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed P2

Circle one: Tc | Tt through subarea _____

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.4			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.055			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	33			
9. Watercourse slope, s		ft/ft	0.068			
10. Average Velocity, V (figure 3-1)		ft/s	4.21			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.5

(210-VI-TR-55, Second Ed., June 1986)

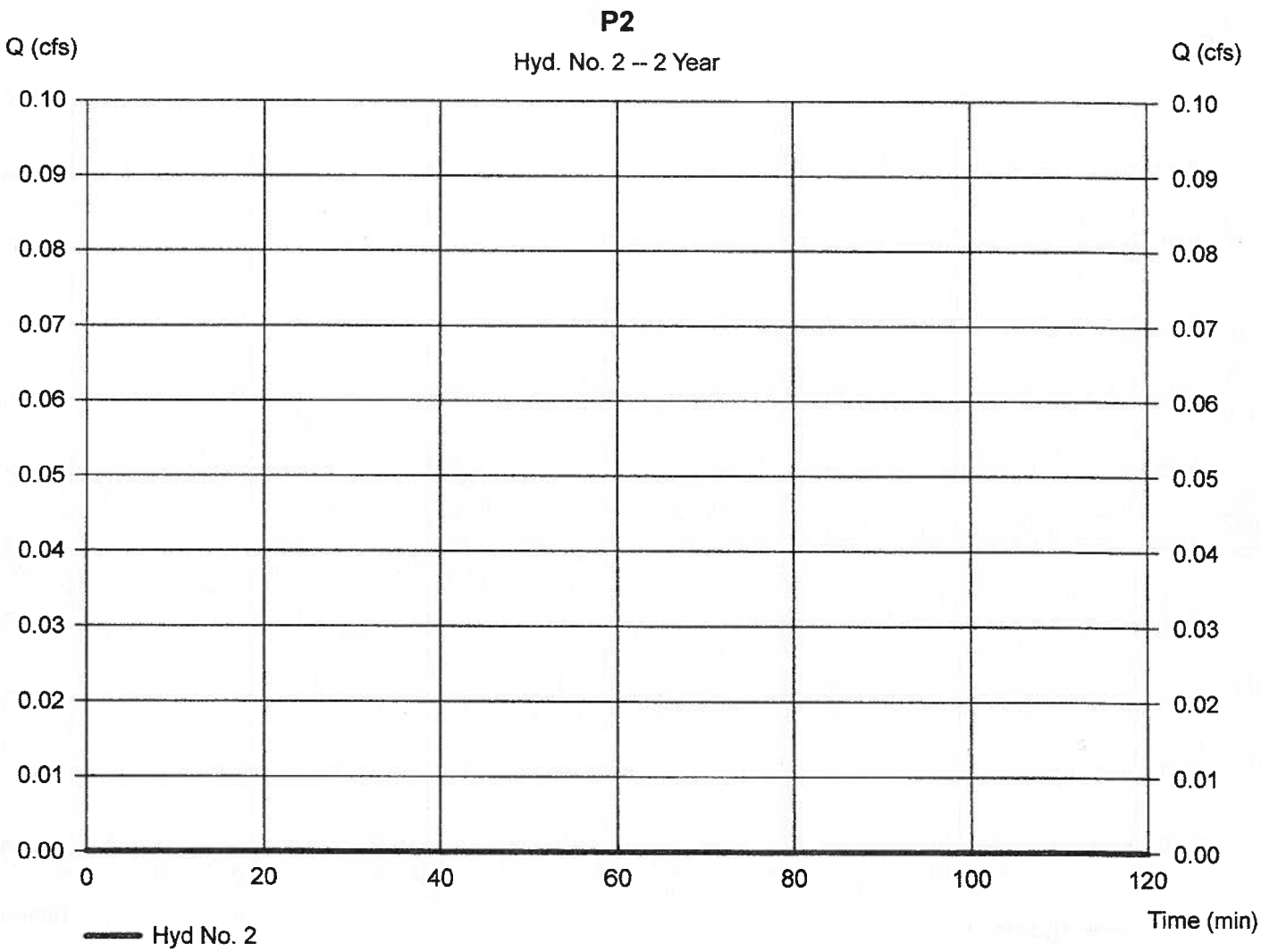
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



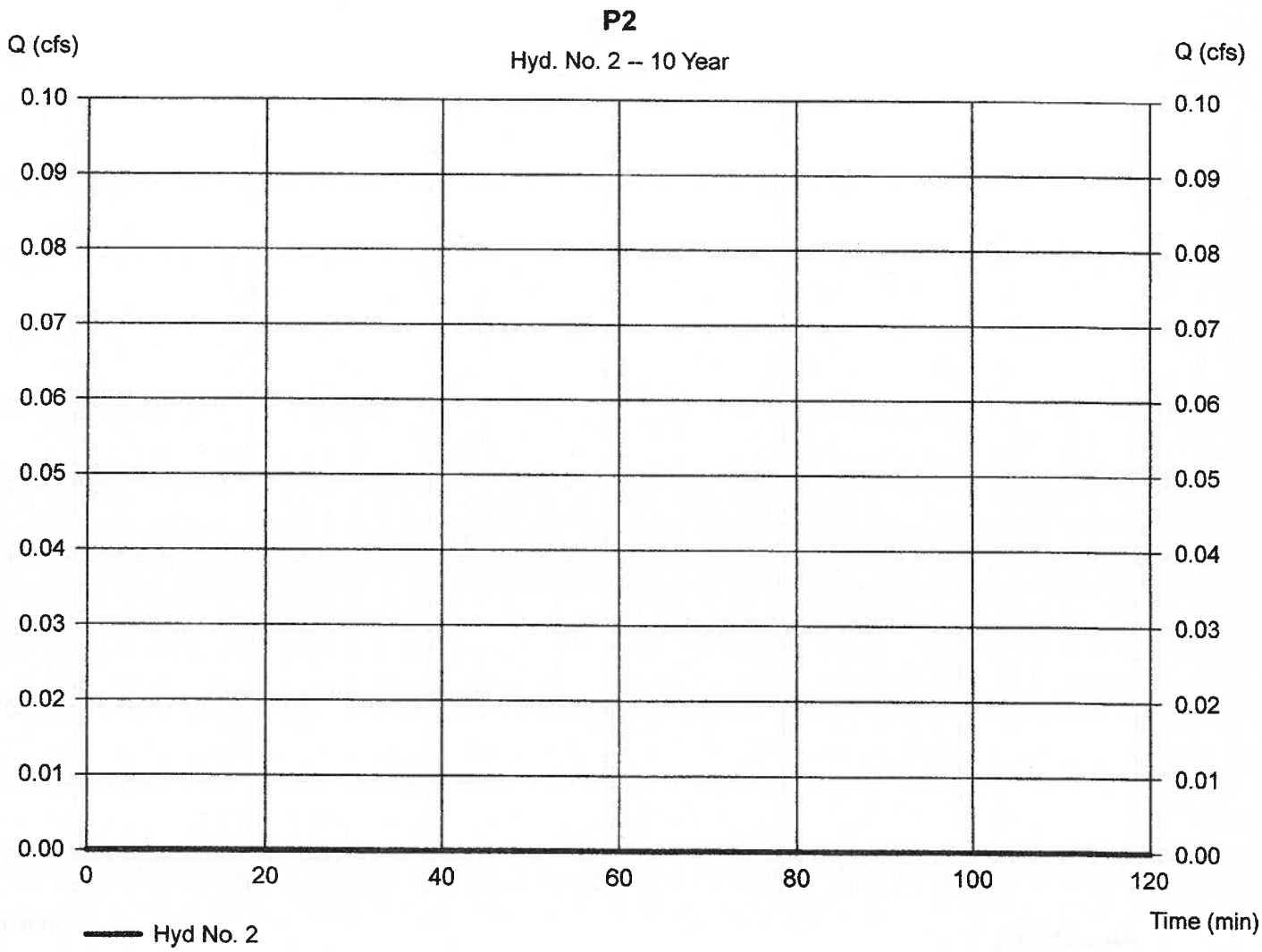
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



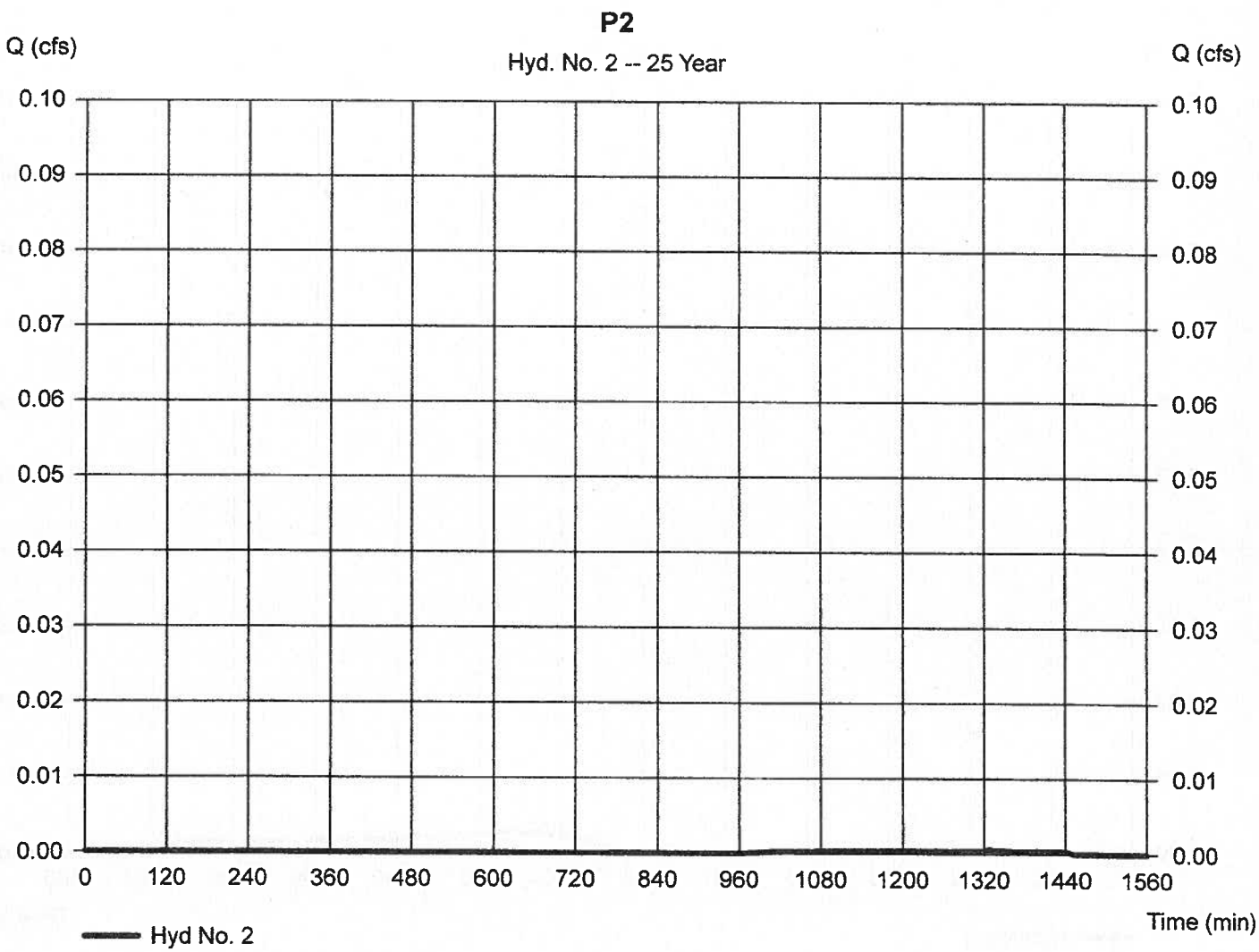
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 25 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 10 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



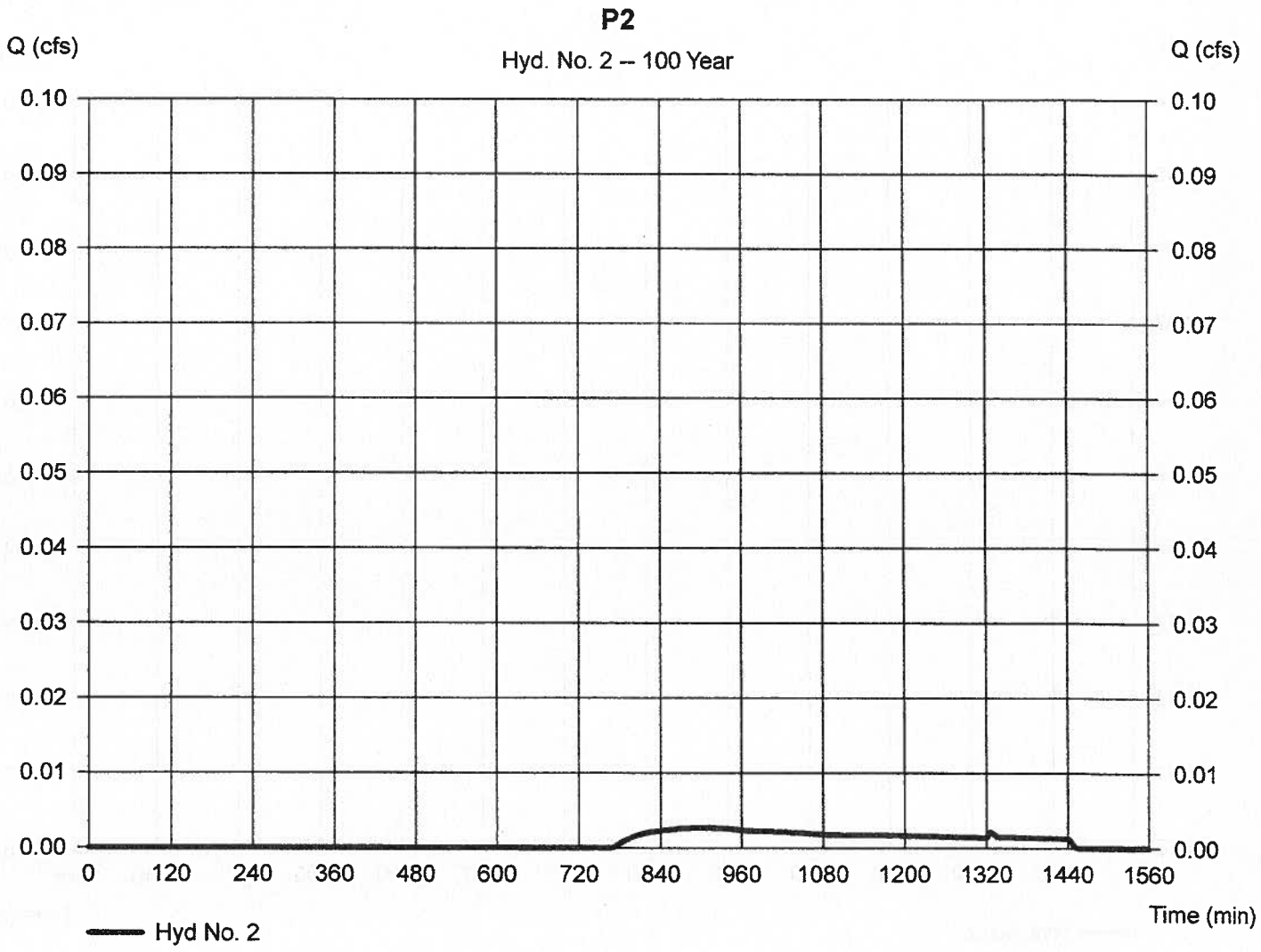
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 100 yrs	Time to peak	= 902 min
Time interval	= 2 min	Hyd. volume	= 74 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff SM-4860

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.76	22.89
A	Open	39			0.01	0.31
	Impervious	98			0.00	0.39
A	Gravel	76			0.00	0.00
					Totals =	0.78	23.59

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{23.59}{0.78} = 30.44$; Use CN = 30.4

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.10	0.00	0.14
Runoff, Q.....	cf	284	1	382

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed P3

Circle one: Tc | Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.4			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.03			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	81			
9. Watercourse slope, s		ft/ft	0.027			
10. Average Velocity, V (figure 3-1)		ft/s	2.65			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19

min 11.2

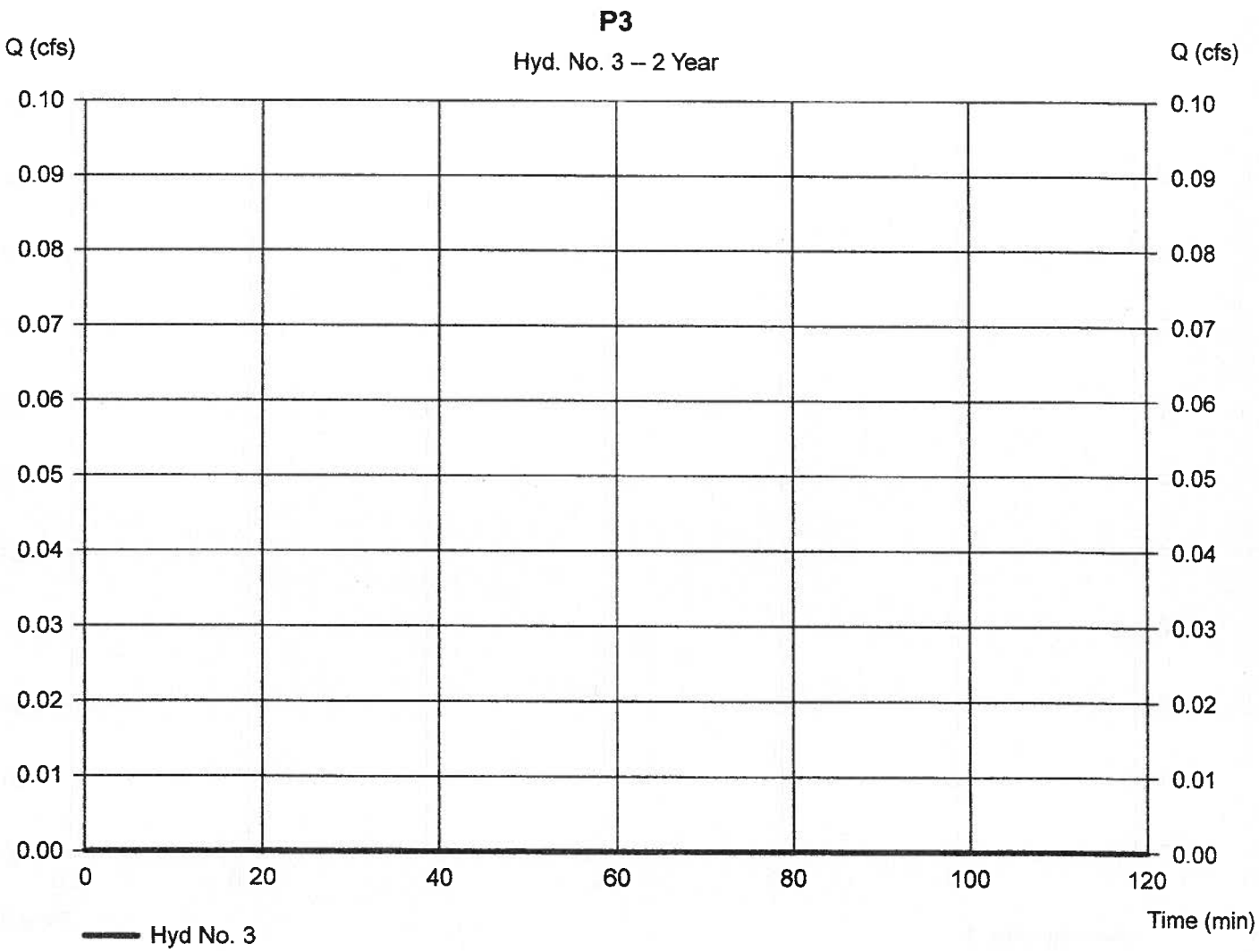
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.780 ac	Curve number	= 30.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



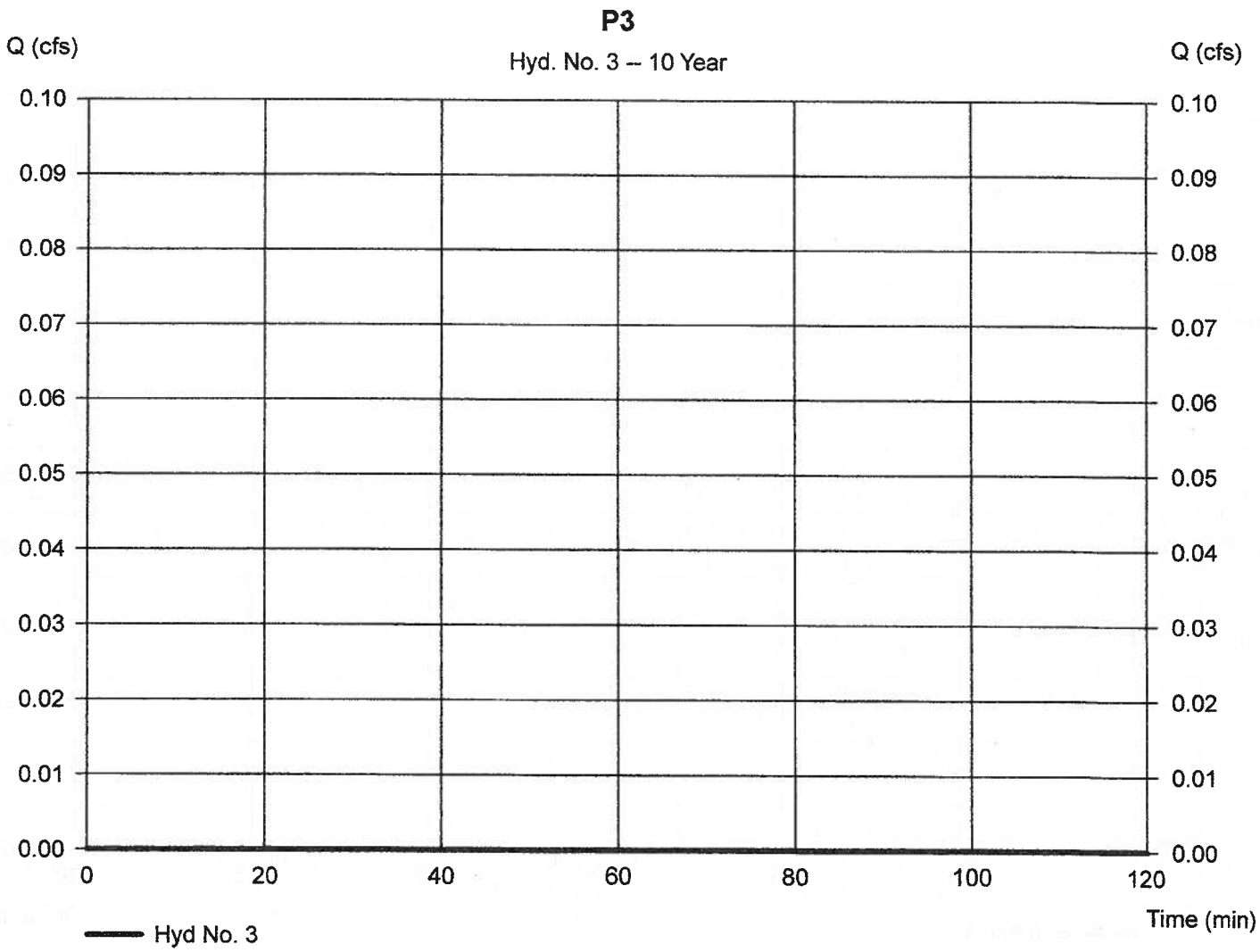
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Drainage area	=	0.780 ac	Curve number	=	30.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.20 min
Total precip.	=	4.50 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



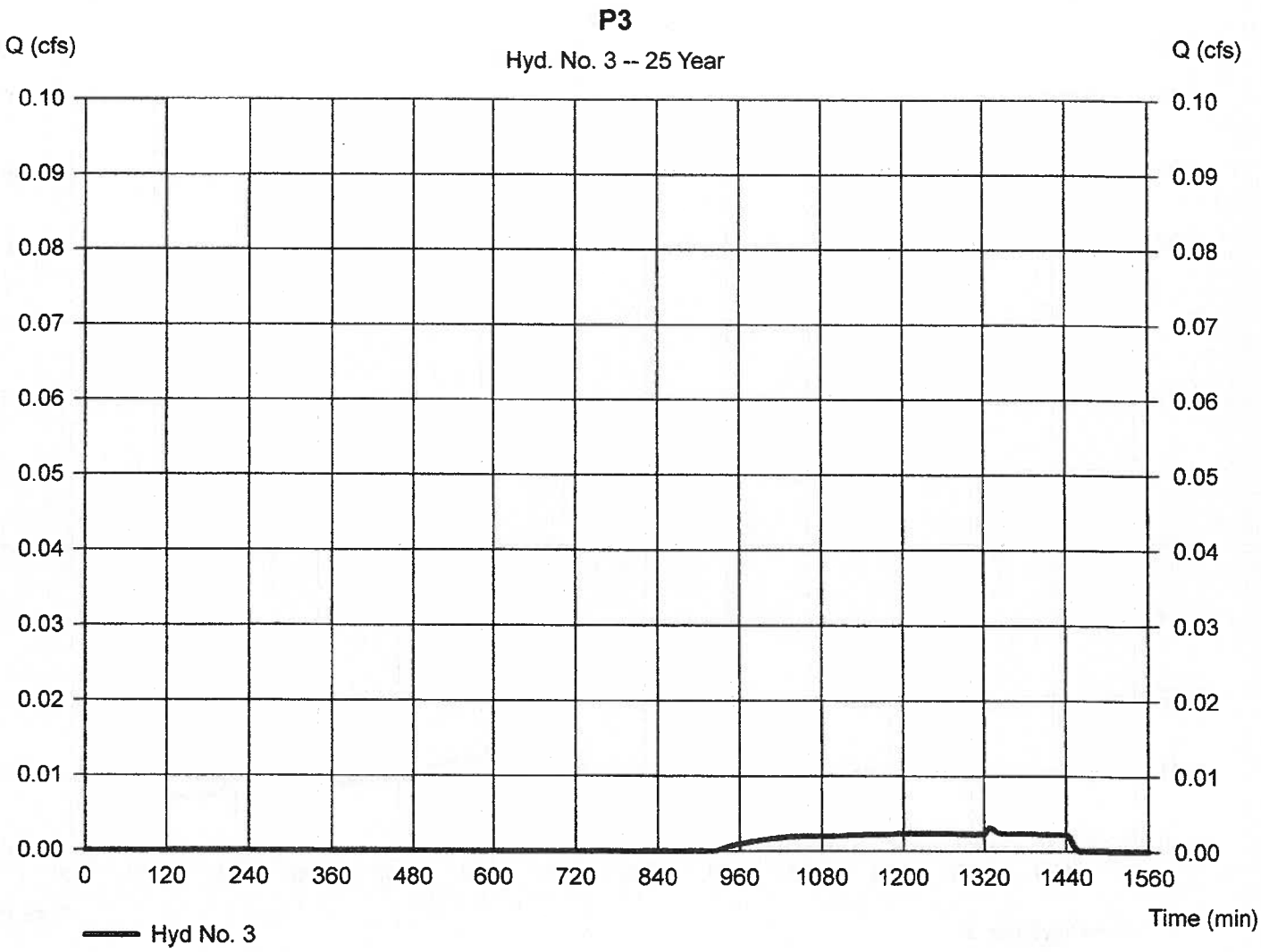
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.003 cfs
Storm frequency	=	25 yrs	Time to peak	=	1328 min
Time interval	=	2 min	Hyd. volume	=	64 cuft
Drainage area	=	0.780 ac	Curve number	=	30.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.20 min
Total precip.	=	5.30 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



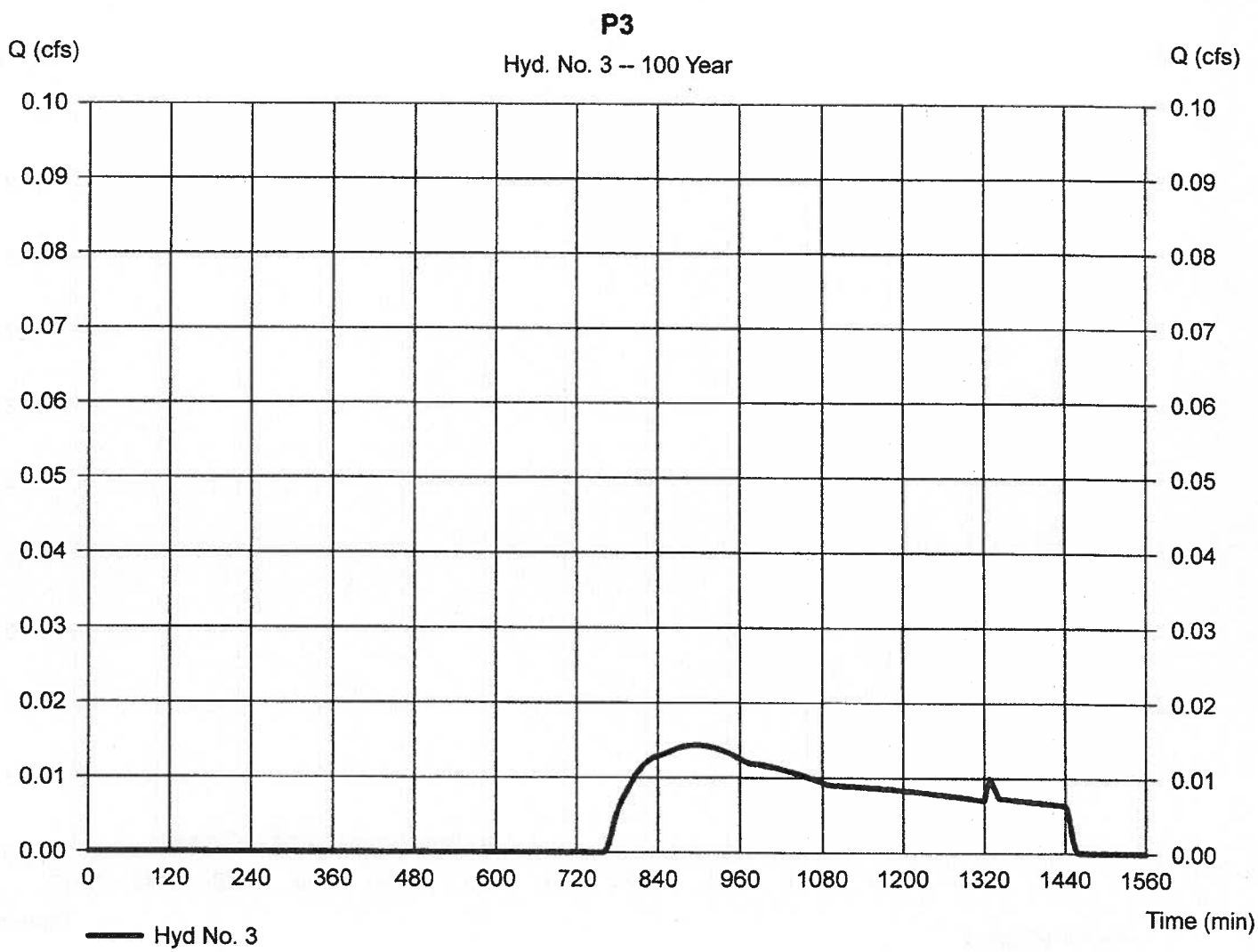
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 100 yrs	Time to peak	= 896 min
Time interval	= 2 min	Hyd. volume	= 392 cuft
Drainage area	= 0.780 ac	Curve number	= 30.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff SM-4860

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P4

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			0.02	0.57
A	Open	39			0.56	21.72
	Impervious	98			0.32	31.07
A	Gravel	76			0.03	1.90
					Totals =	0.92	55.26

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{55.26}{0.92} = 60.19$; Use CN = 60.2

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.38	1.03	2.21
Runoff, Q.....	cf	1255	3437	7349

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed P4

Circle one: Tc | Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Grass			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.045			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.10			0.10
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	54			
9. Watercourse slope, s		ft/ft	0.02			
10. Average Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.11

min 6.4

(210-VI-TR-55, Second Ed., June 1986)

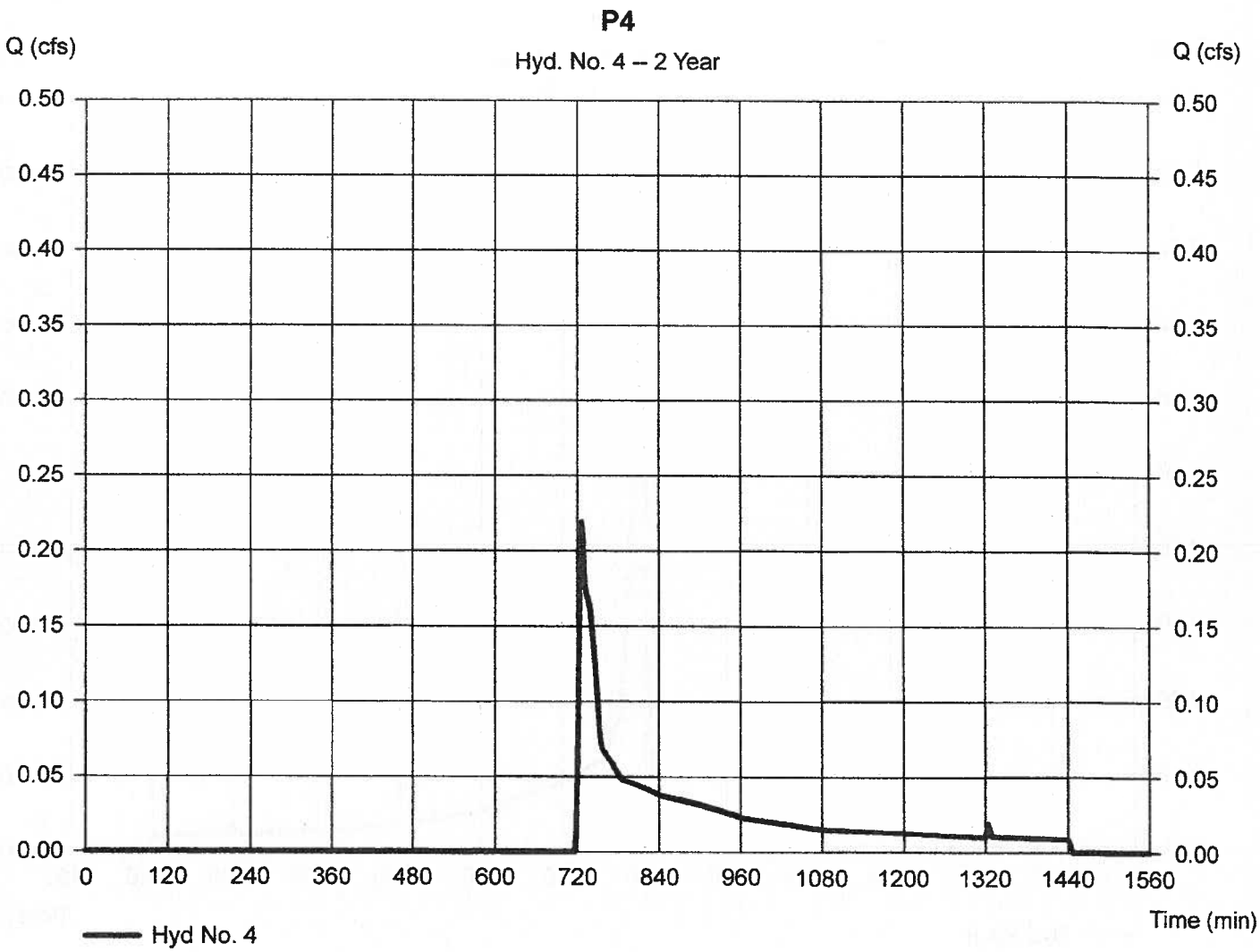
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.219 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,179 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



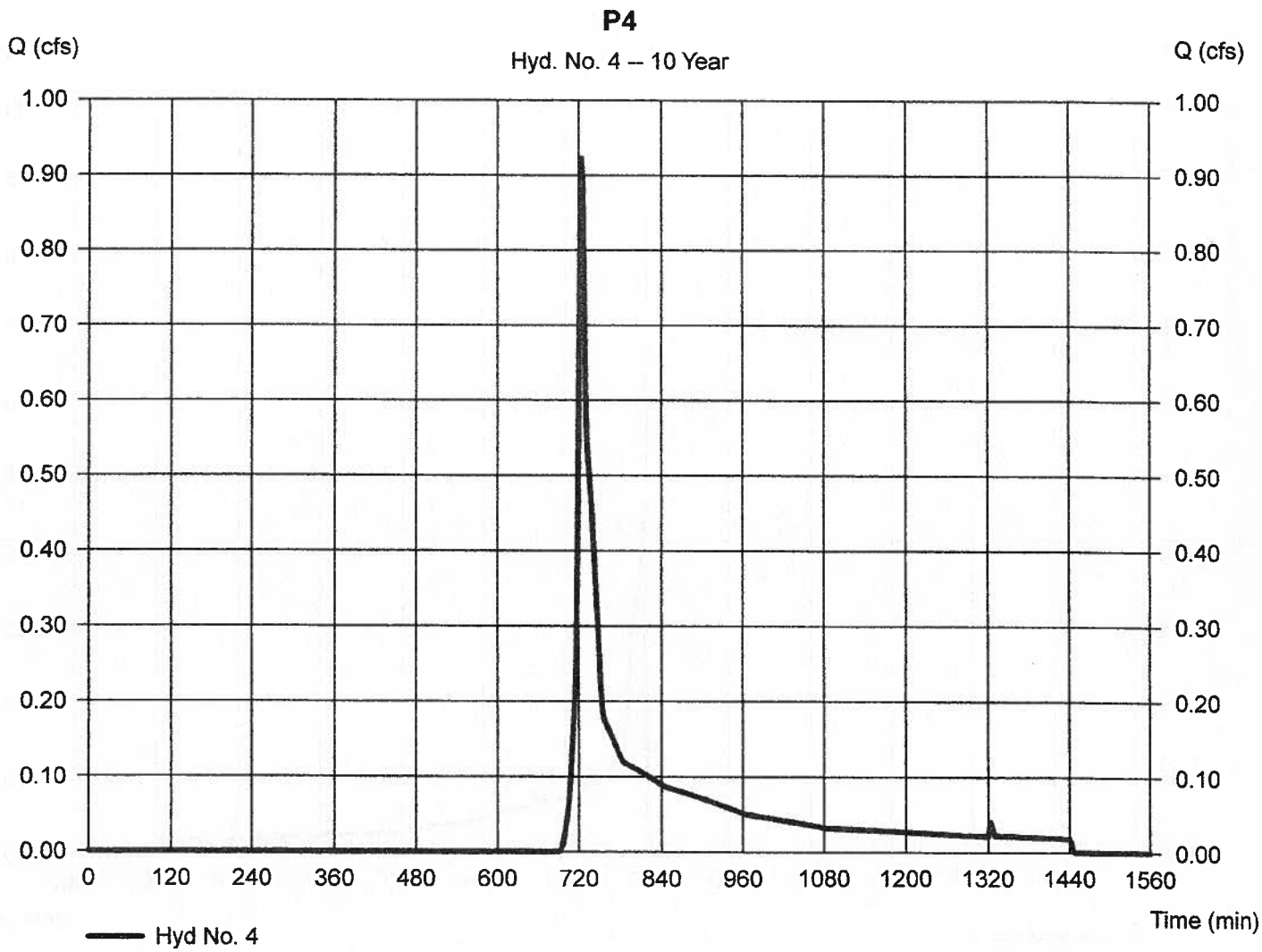
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.923 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 3,230 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



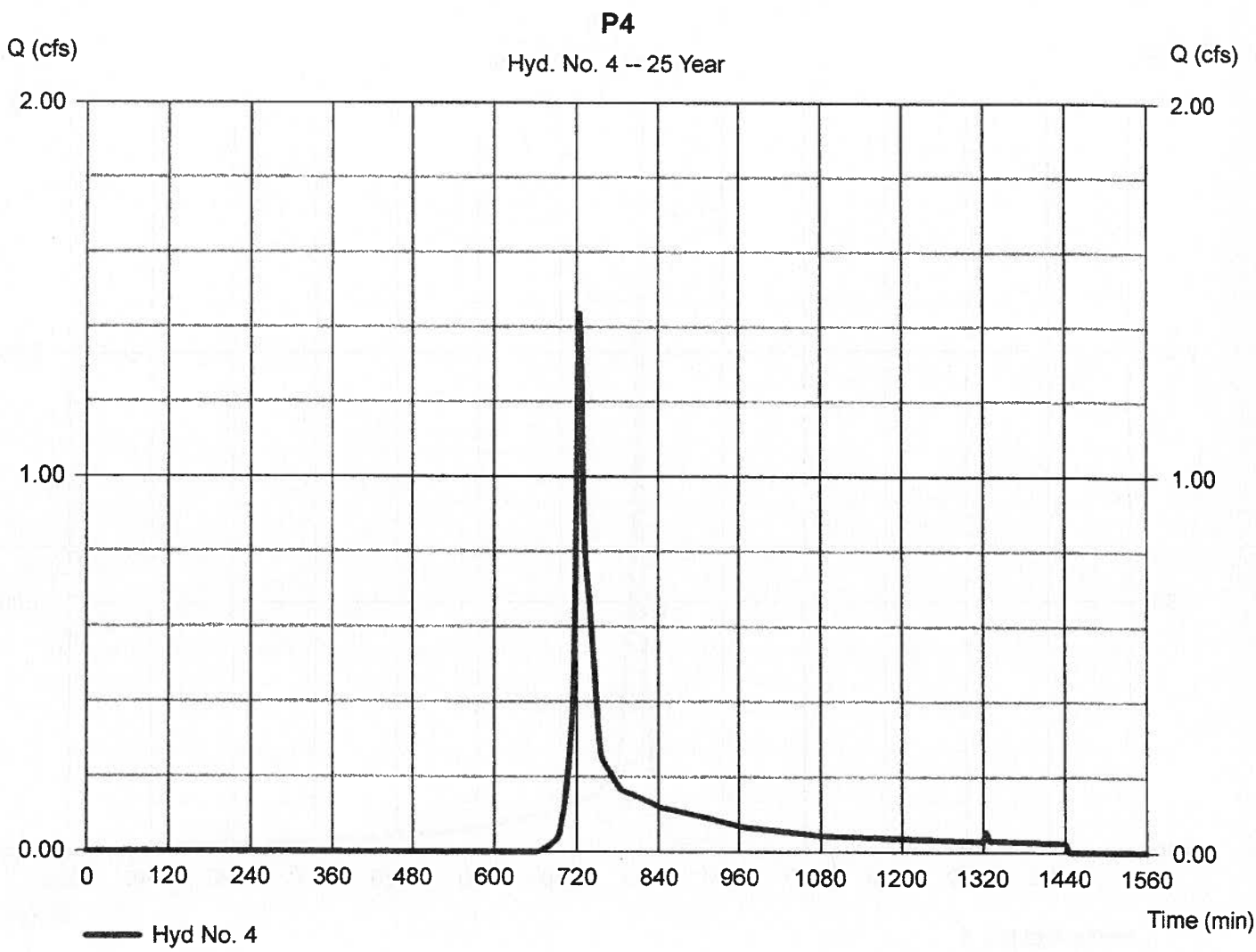
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.436 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,678 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



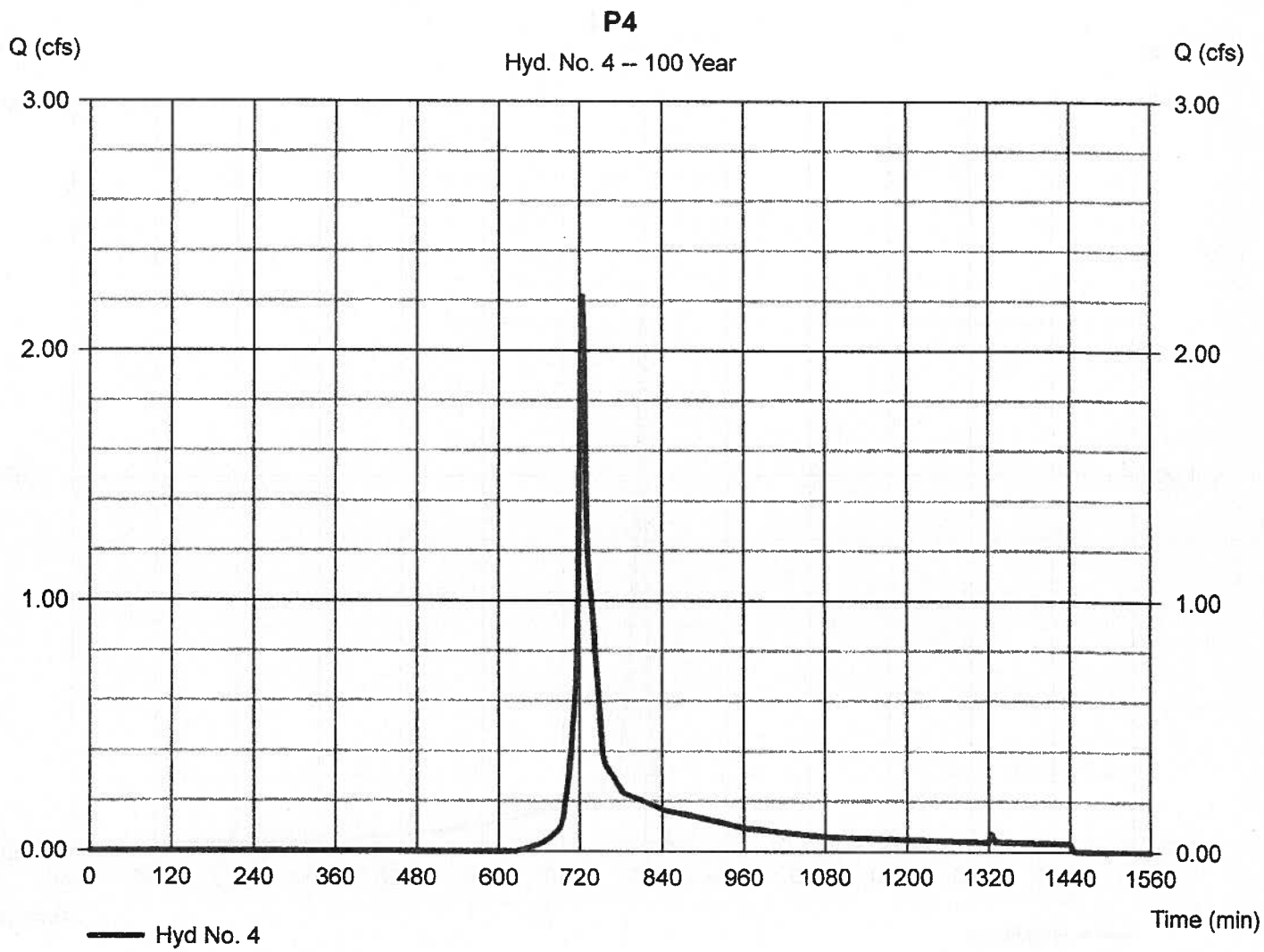
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.219 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 6,906 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

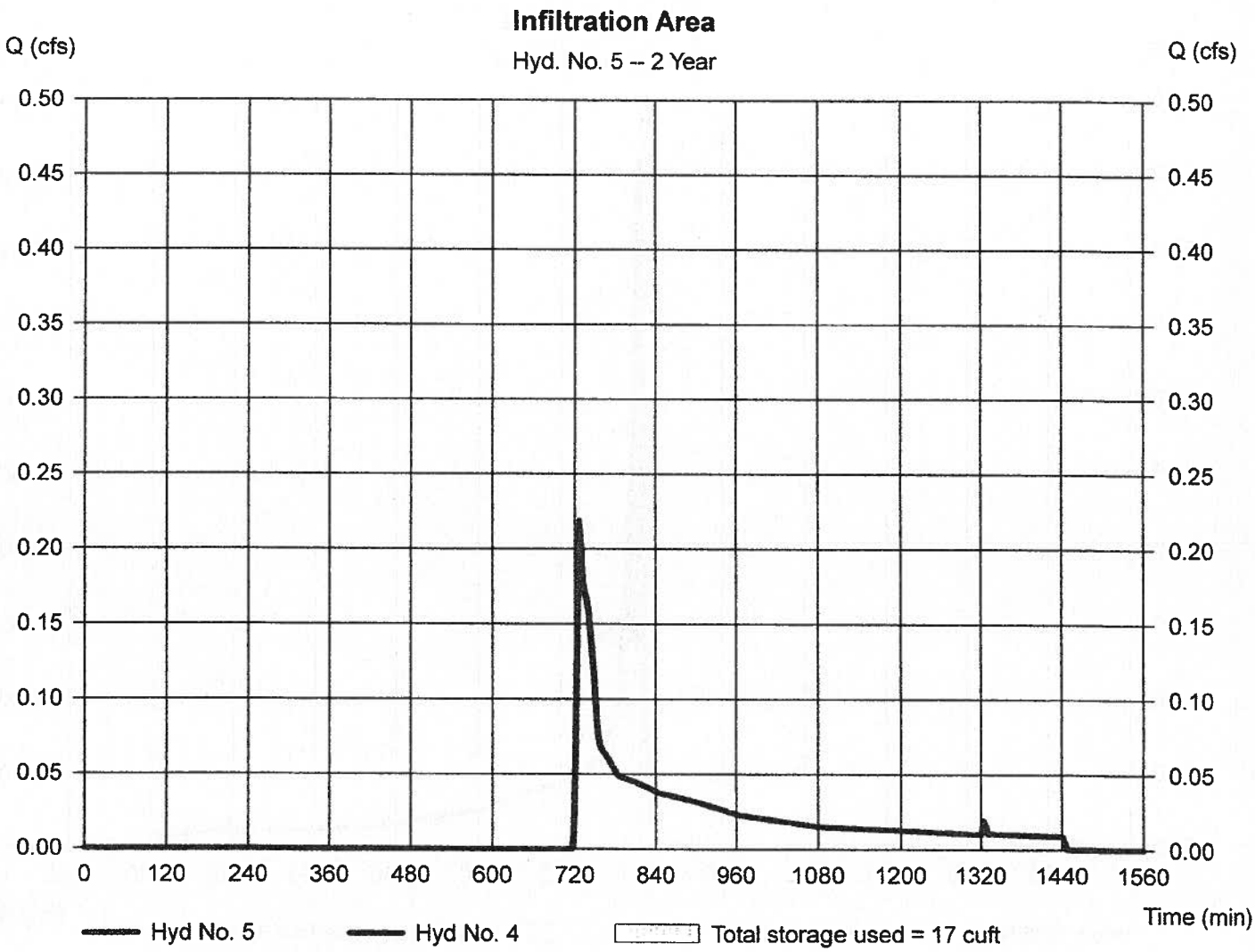
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.211 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,179 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 153.04 ft
Reservoir name	= Subsurface	Max. Storage	= 17 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

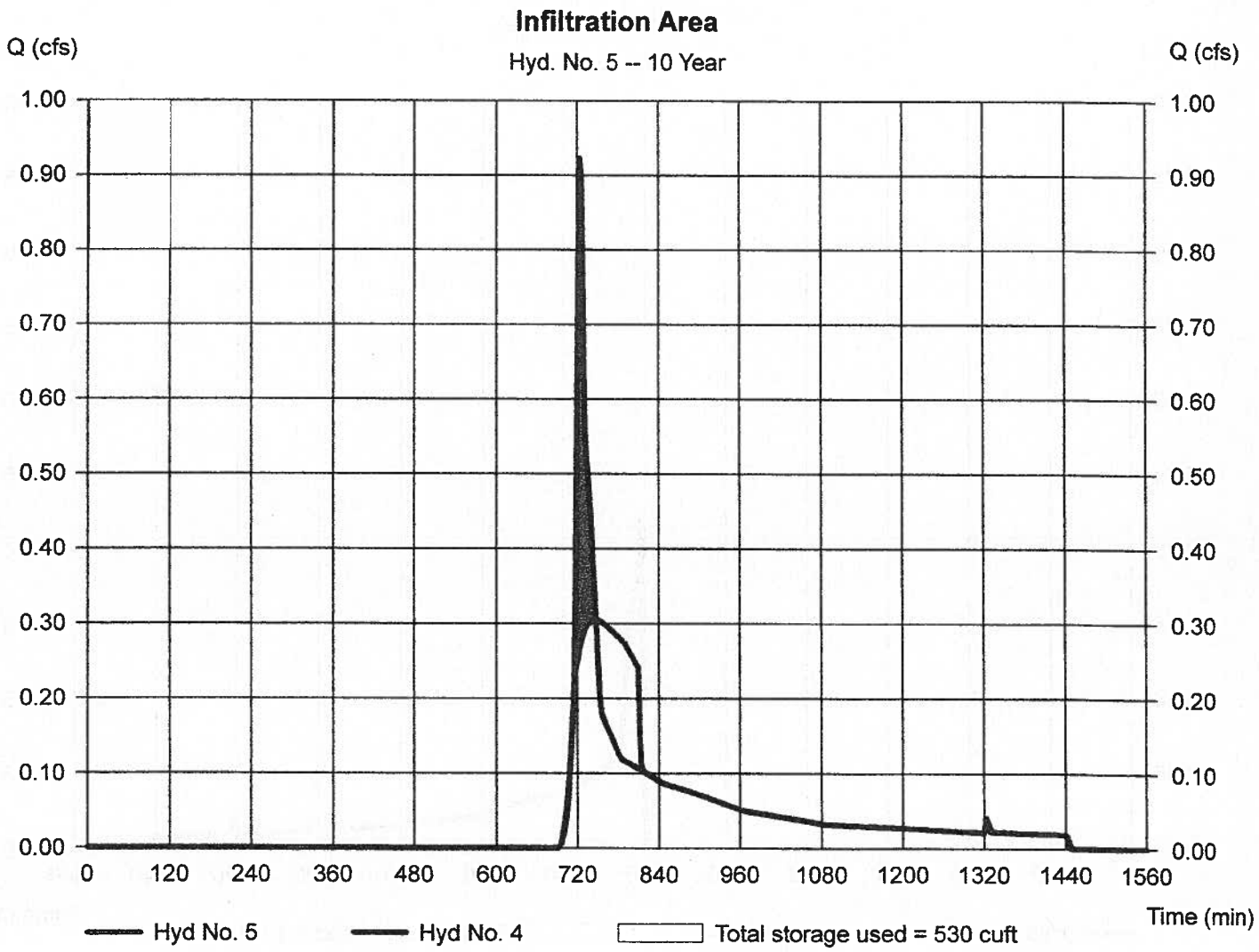
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.305 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,230 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 153.75 ft
Reservoir name	= Subsurface	Max. Storage	= 530 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

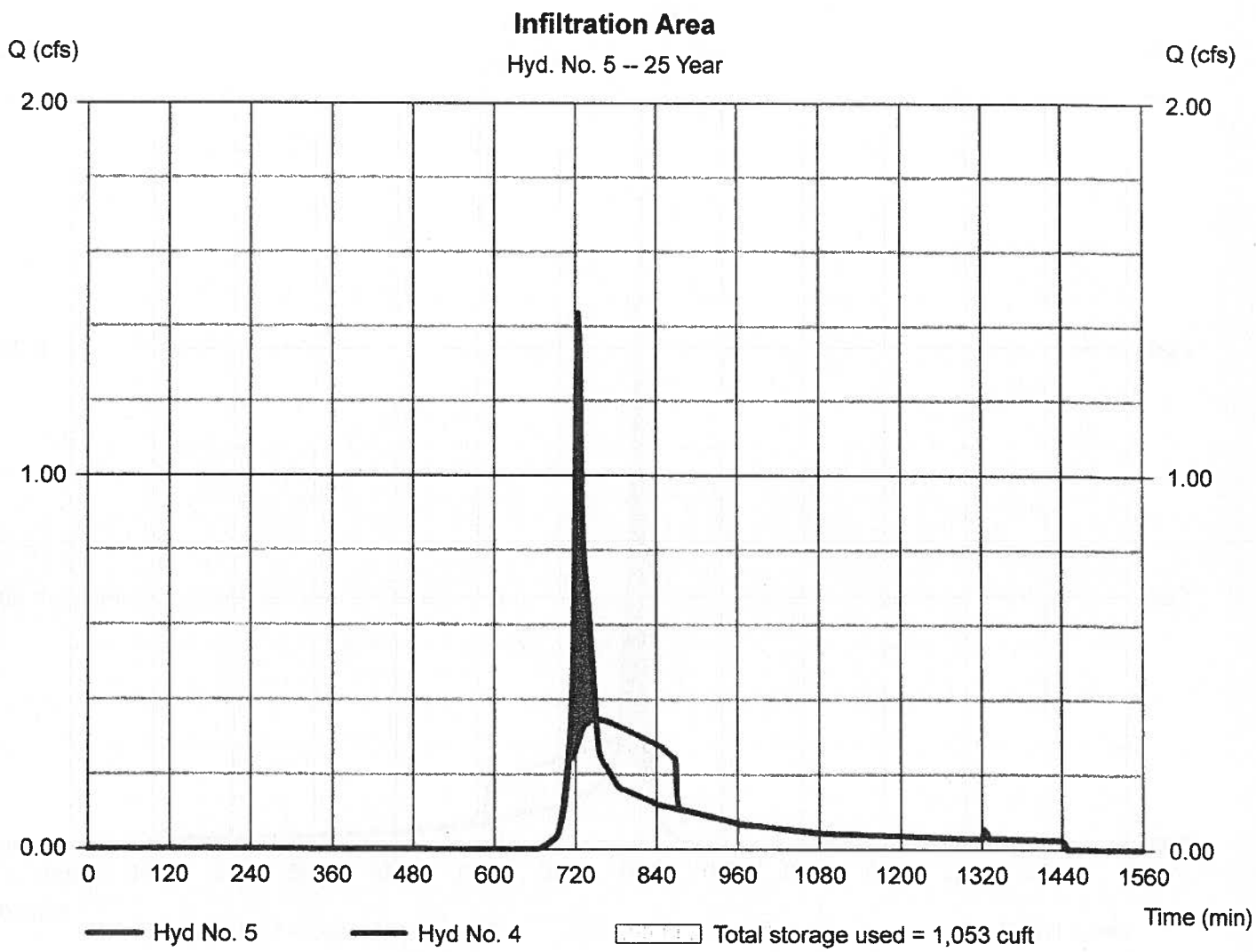
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.349 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 4,678 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 154.24 ft
Reservoir name	= Subsurface	Max. Storage	= 1,053 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

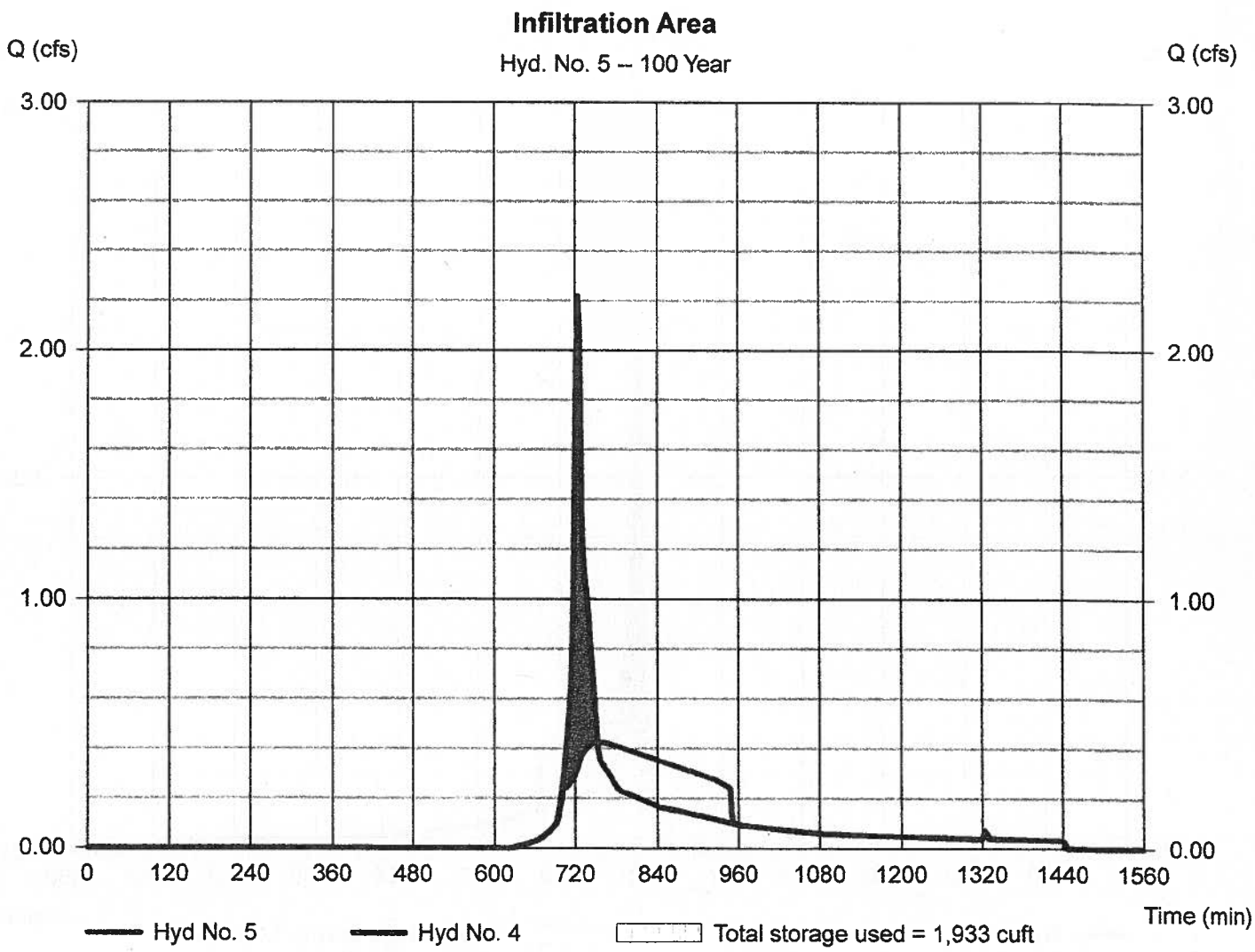
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.427 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 6,906 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 155.10 ft
Reservoir name	= Subsurface	Max. Storage	= 1,933 cuft

Storage Indication method used. Outflow includes exfiltration.



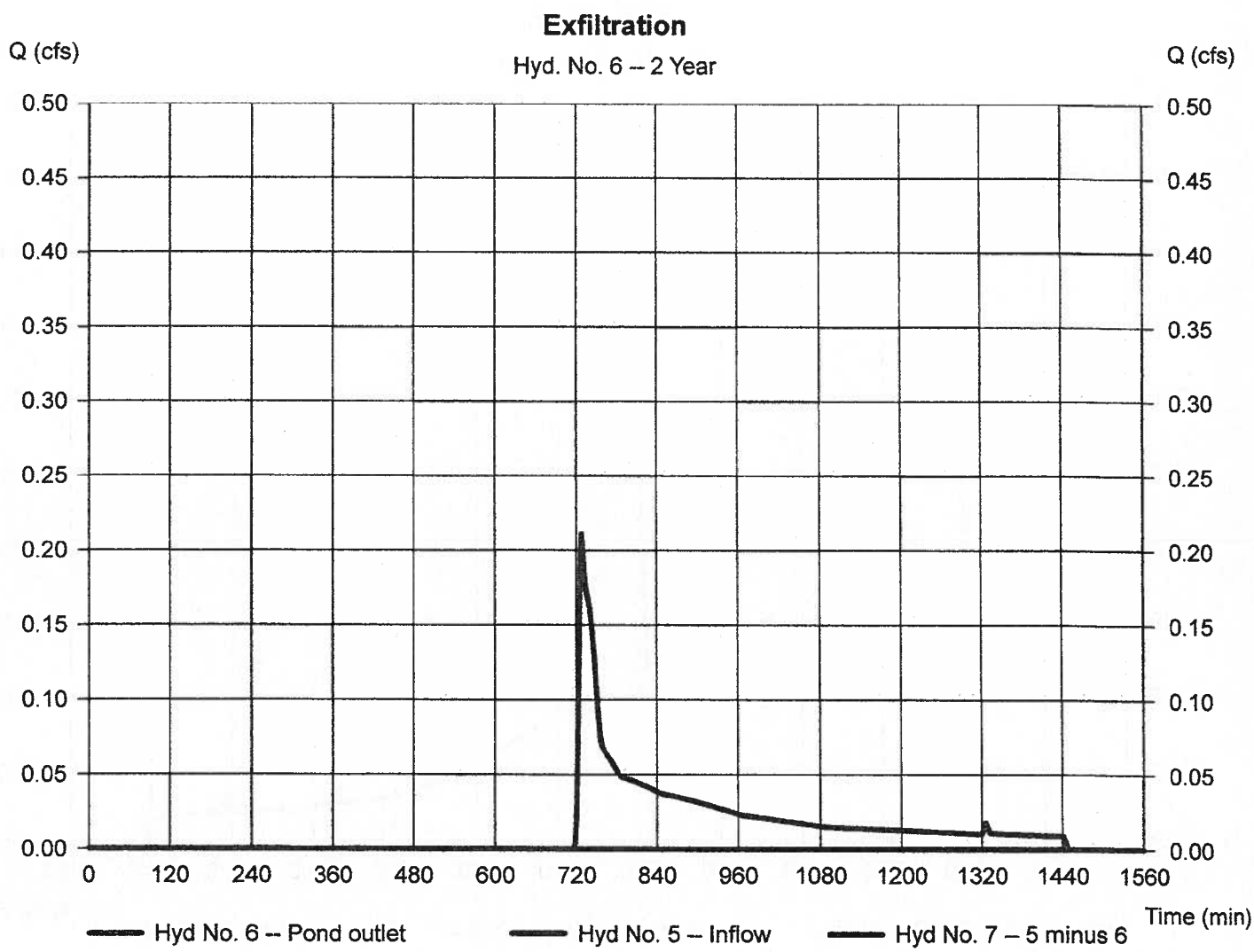
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.211 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,179 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 7
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



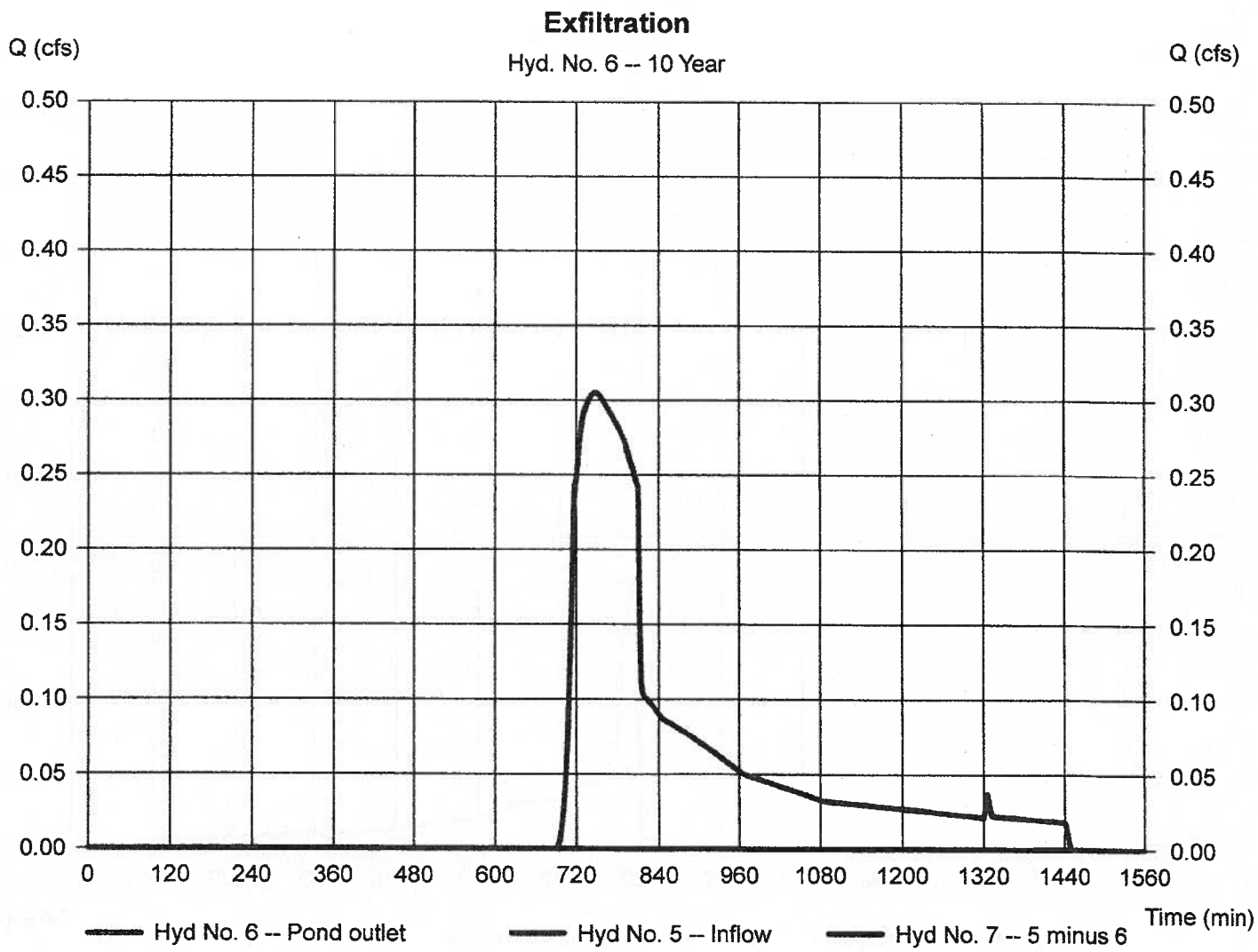
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.305 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,230 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 7
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



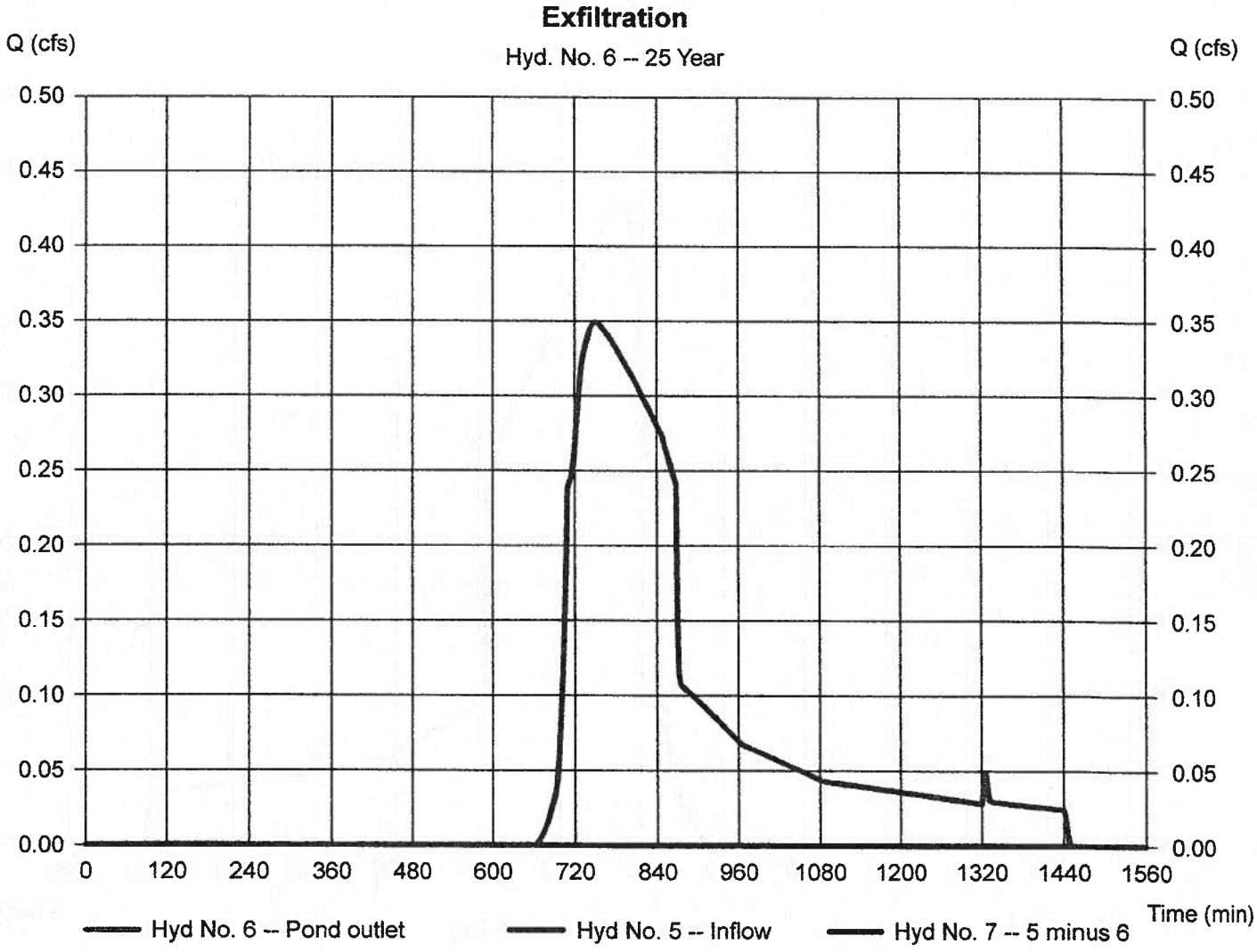
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.349 cfs
Storm frequency	=	25 yrs	Time to peak	=	750 min
Time interval	=	2 min	Hyd. volume	=	4,678 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	7
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



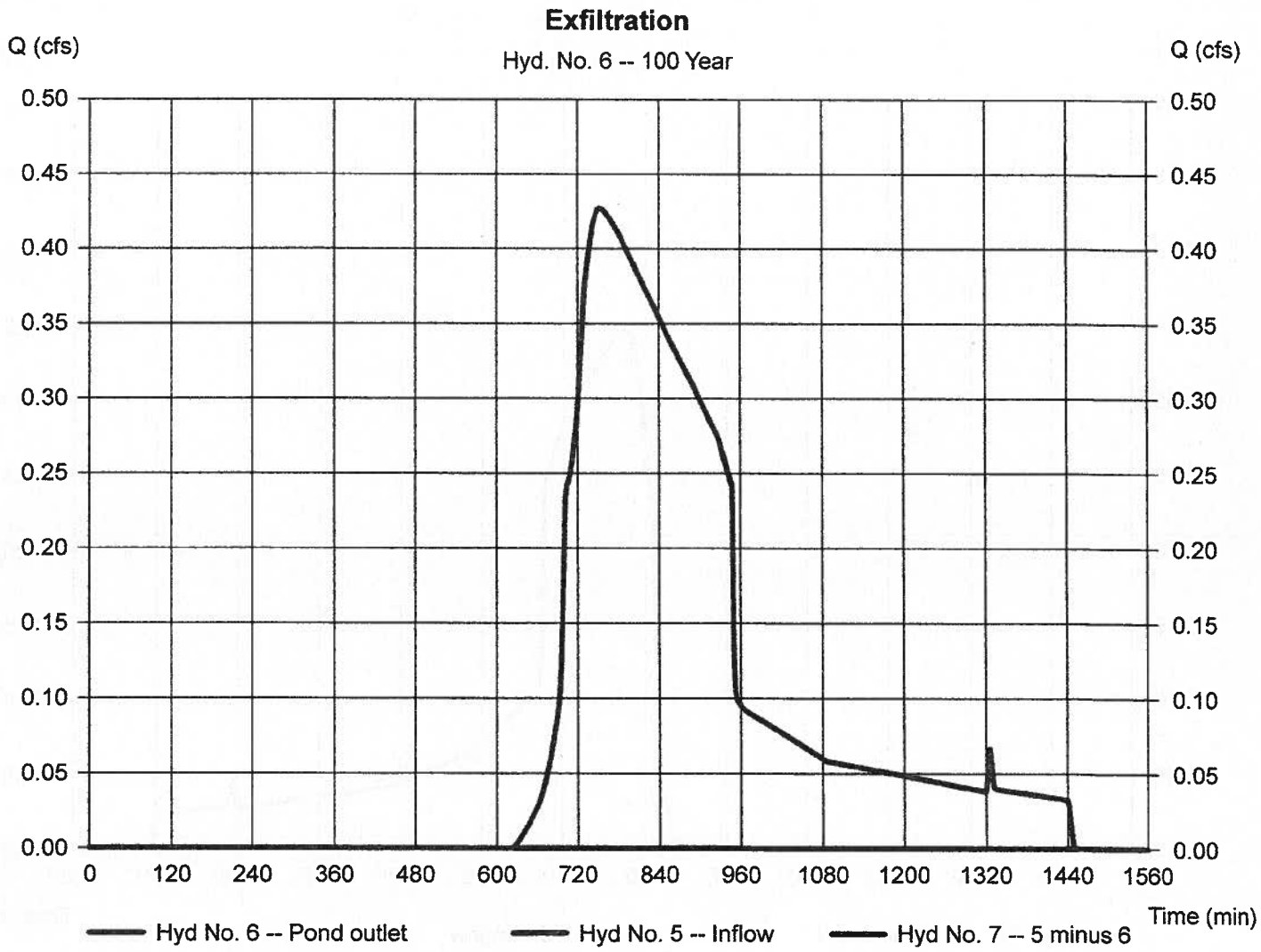
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.427 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 6,906 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 7
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



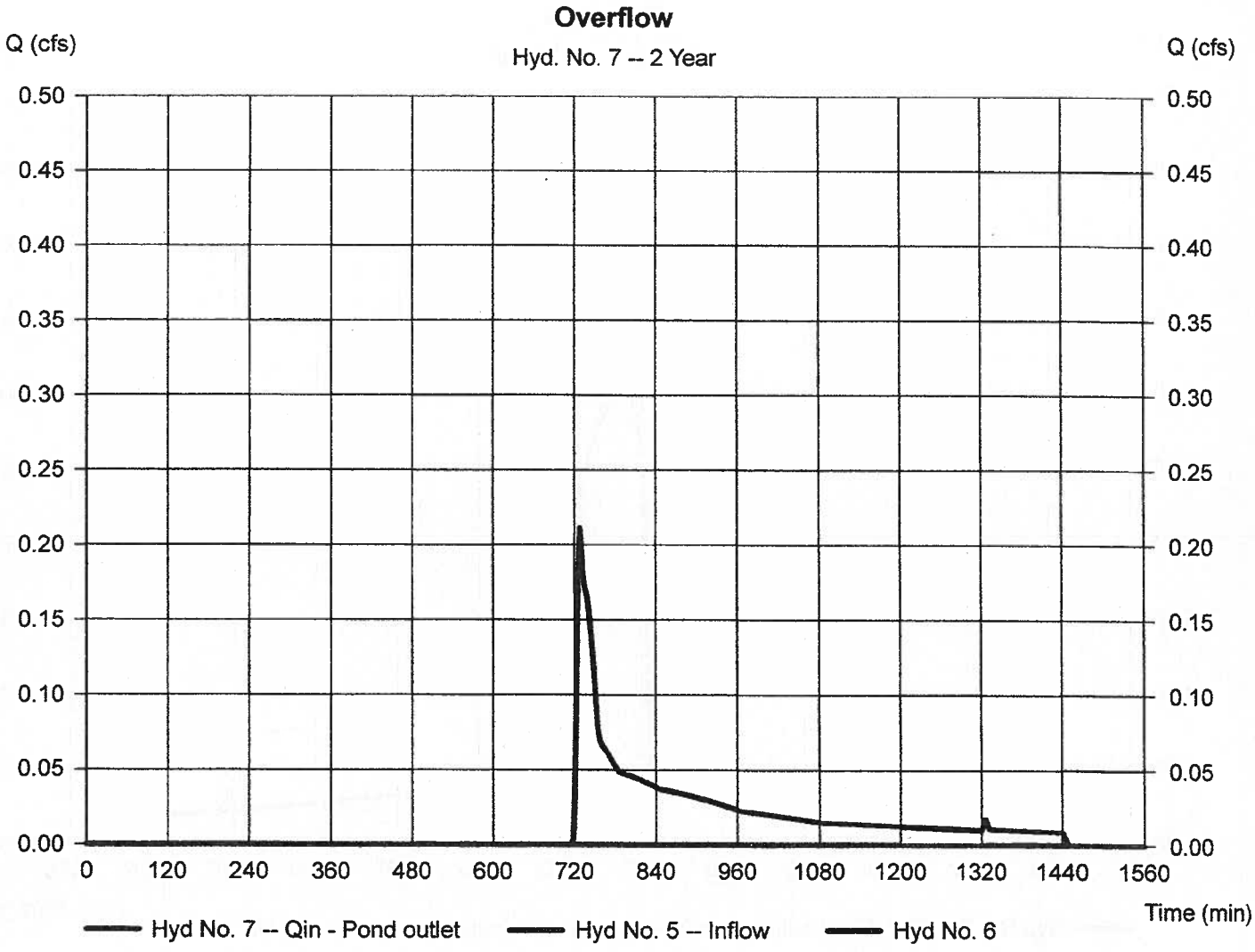
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	6
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



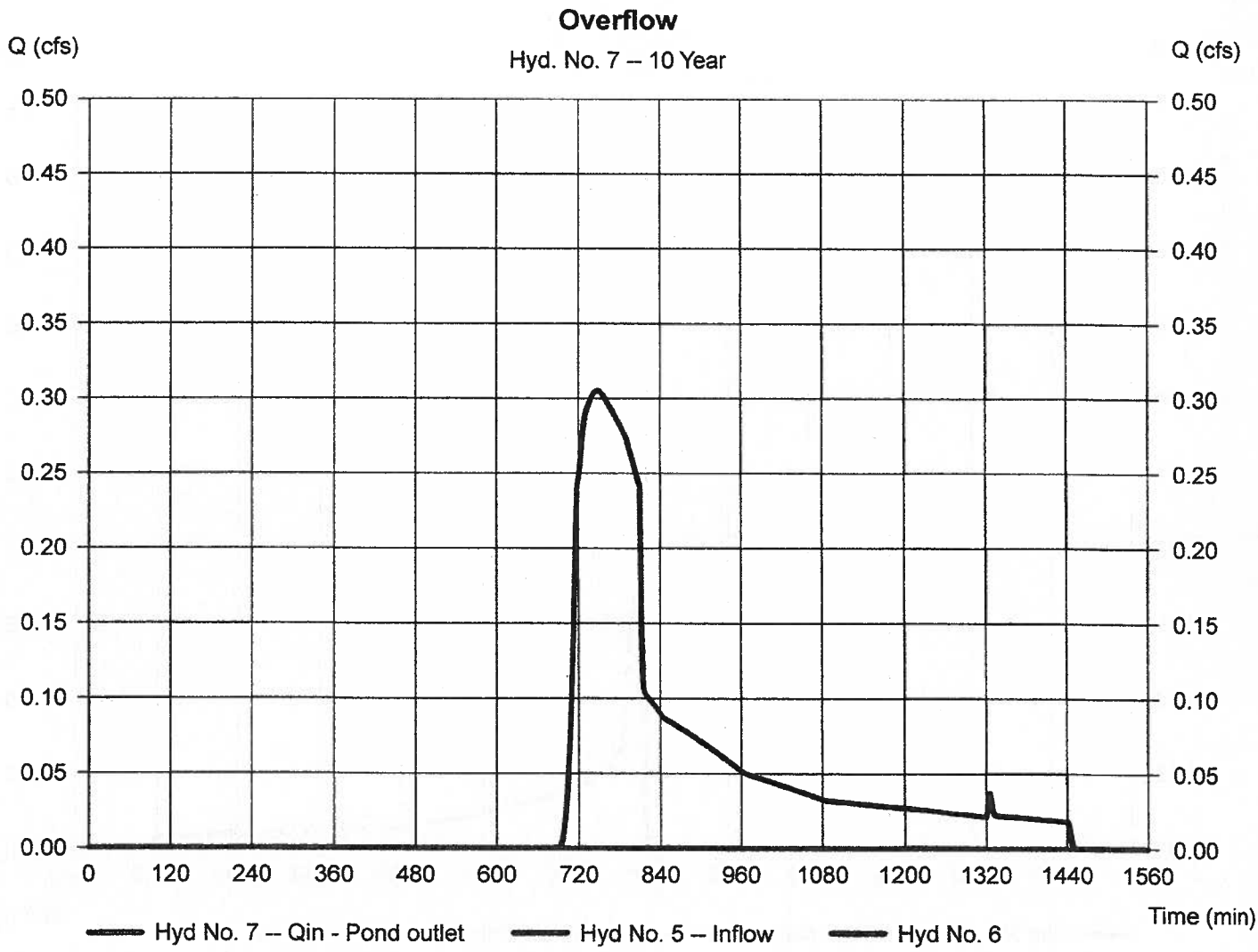
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 824 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 6
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



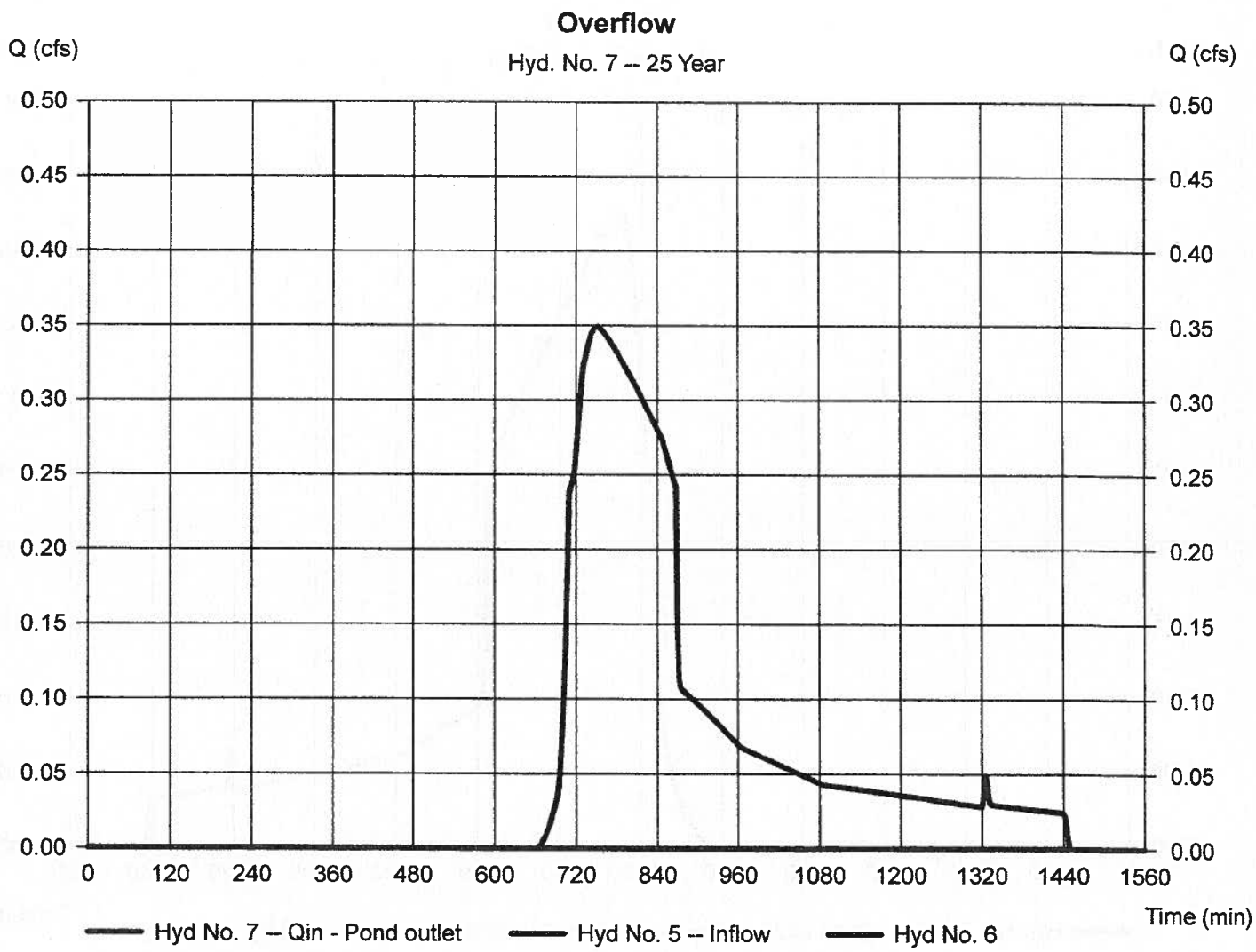
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	25 yrs	Time to peak	=	708 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	6
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



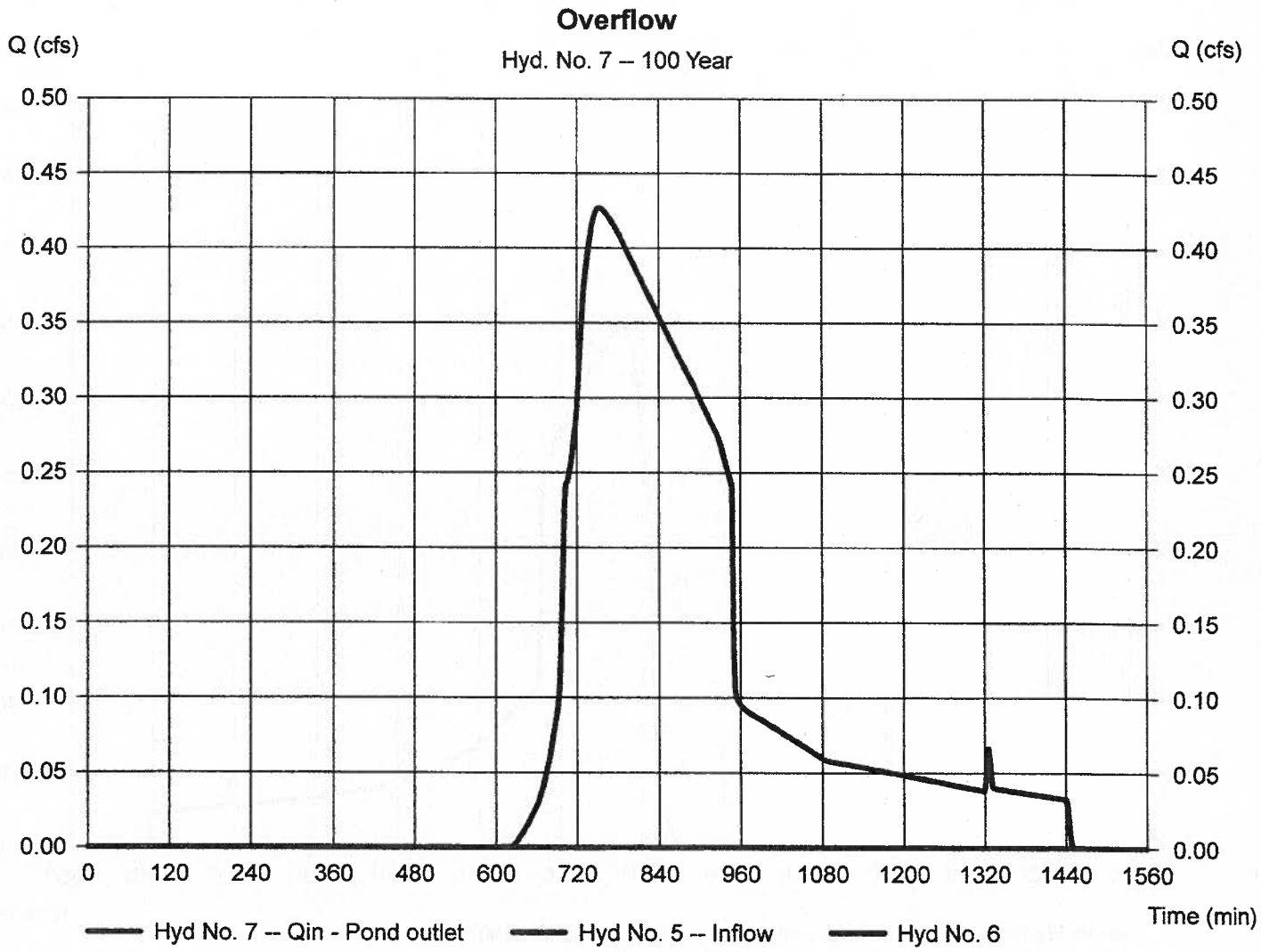
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 1080 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 6
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Pond No. 1 - Subsurface

Pond Data

UG Chambers - Invert elev. = 153.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 59.00 ft, No. Barrels = 4, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 153.00 ft, Width = 5.25 ft, Height = 4.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	153.00	n/a	0	0
0.40	153.40	n/a	198	198
0.80	153.80	n/a	378	577
1.20	154.20	n/a	434	1,011
1.60	154.60	n/a	423	1,433
2.00	155.00	n/a	404	1,837
2.40	155.40	n/a	374	2,211
2.80	155.80	n/a	327	2,538
3.20	156.20	n/a	230	2,768
3.60	156.60	n/a	198	2,966
4.00	157.00	n/a	198	3,165

Culvert / Orifice Structures

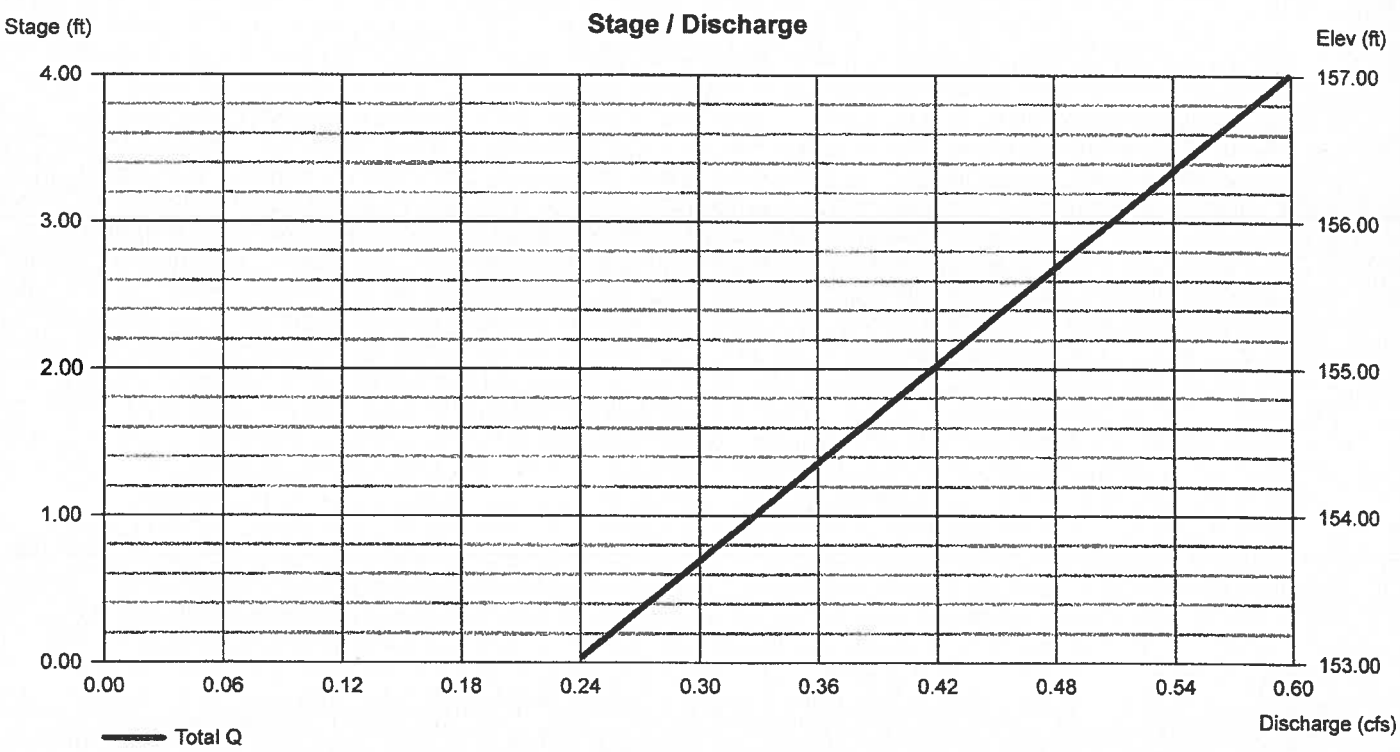
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.232 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- (min)	Outflow (cfs)
724	0.232 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.339 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- (min	Outflow cfs)
724	0.339 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.400 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min cfs)	
724	0.400 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.484 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min cfs)	
724	0.484 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.056 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 154.27 ft	Max. Storage	= 172 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
738	0.081	154.24	-----	-----	-----	-----	-----	-----	-----	-----	0.055	0.055
740	0.074	154.25	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
742	0.067	154.26	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
744	0.061	154.27	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
746	0.054	154.27 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056 <<
748	0.047	154.27	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
750	0.040	154.26	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
752	0.034	154.24	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.067 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 155.06 ft	Max. Storage	= 301 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
742	0.098	155.02	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
744	0.088	155.05	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
746	0.078	155.06	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
748	0.069	155.06 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067 <<
750	0.059	155.06	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
752	0.050	155.05	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
754	0.043	155.03	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.075 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 155.60 ft	Max. Storage	= 377 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
744	0.104	155.57	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
746	0.092	155.59	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
748	0.081	155.60 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075 <<
750	0.069	155.60	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
752	0.058	155.59	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
754	0.051	155.57	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.091 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 156.73 ft	Max. Storage	= 481 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
746	0.112	156.70	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
748	0.098	156.72 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091 <<
750	0.083	156.72	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
752	0.071	156.70	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
754	0.061	156.66	-----	-----	-----	-----	-----	-----	-----	-----	0.090	0.090

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.056 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
738	0.055	0.000	0.055
740	0.056	0.000	0.056
742	0.056	0.000	0.056
744	0.056	0.000	0.056
746	0.056 <<	0.000	0.056 <<
748	0.056	0.000	0.056
750	0.056	0.000	0.056
752	0.056	0.000	0.056

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.067 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
742	0.067	0.000	0.067
744	0.067	0.000	0.067
746	0.067	0.000	0.067
748	0.067 <<	0.000	0.067 <<
750	0.067	0.000	0.067
752	0.067	0.000	0.067
754	0.067	0.000	0.067

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.075 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
744	0.075	0.000	0.075
746	0.075	0.000	0.075
748	0.075 <<	0.000	0.075 <<
750	0.075	0.000	0.075
752	0.075	0.000	0.075
754	0.075	0.000	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.091 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
746	0.091	0.000	0.091
748	0.091 <<	0.000	0.091 <<
750	0.091	0.000	0.091
752	0.091	0.000	0.091
754	0.090	0.000	0.090

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 926 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
926	0.008	0.008	0.000 <<
928	0.008	0.008	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 598 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
598	0.016	0.016	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 556 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
556	0.015	0.015	0.000 <<
560	0.015	0.015	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 640 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
640	0.030	0.030	0.000 <<
644	0.031	0.031	0.000 <<

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2

Friday, Jun 27, 2014

Pond No. 2 - Roof Infiltration

Pond Data

UG Chambers - Invert elev. = 153.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 37.50 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 153.00 ft, Width = 5.25 ft, Height = 4.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	153.00	n/a	0	0
0.40	153.40	n/a	32	32
0.80	153.80	n/a	60	92
1.20	154.20	n/a	69	161
1.60	154.60	n/a	67	228
2.00	155.00	n/a	64	292
2.40	155.40	n/a	59	351
2.80	155.80	n/a	52	403
3.20	156.20	n/a	37	440
3.60	156.60	n/a	32	471
4.00	157.00	n/a	32	503

Culvert / Orifice Structures

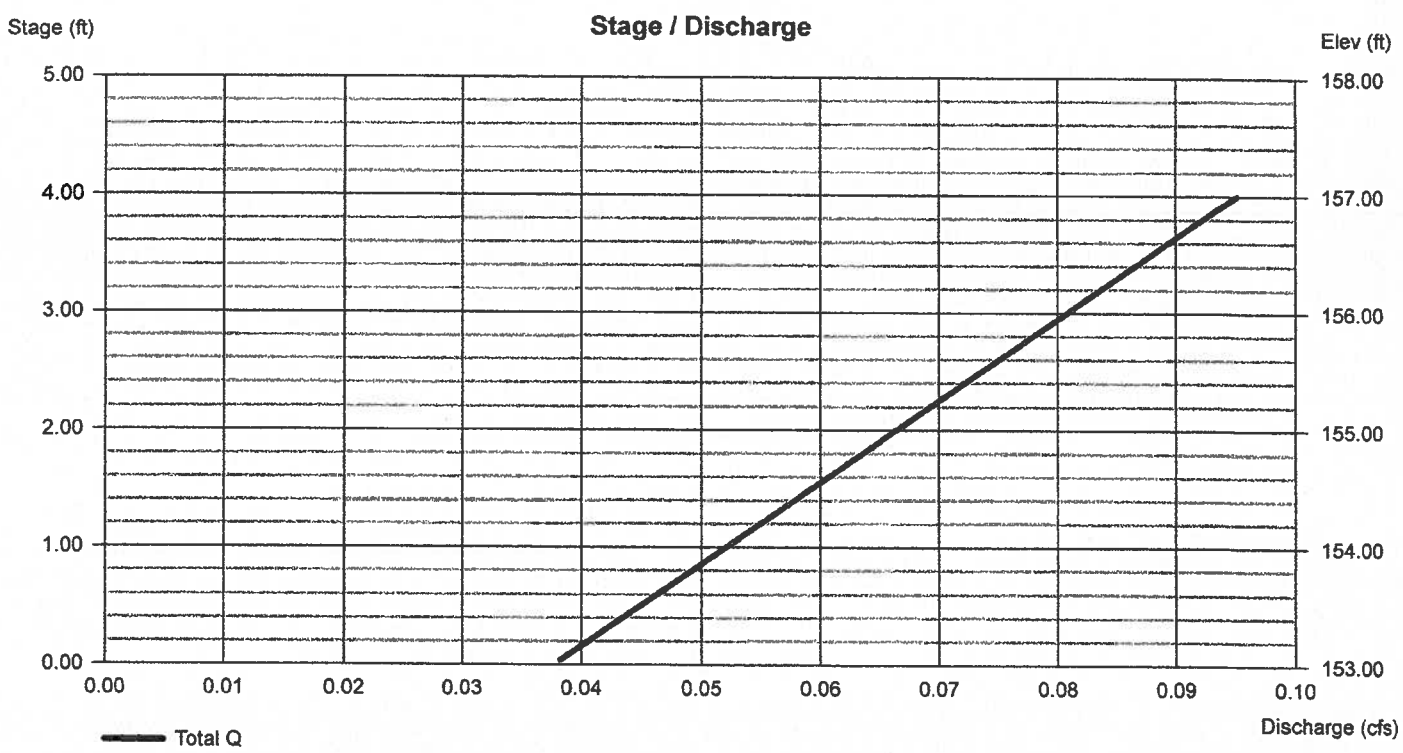
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Water Quality Volume Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860-267 GREAT RD. ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/2014
CHECKED BY _____ DATE _____
SCALE _____

WATER QUALITY VOLUME

$W_{QV} = \frac{1''}{12} \times$ IMPERVIOUS AREA

$W_{QV} = \frac{1''}{12} \times 17{,}348$ SF

$W_{QV} = 1{,}446$ CF

VOLUME TO BE TREATED WITH CONTECH CDS 2015-4 UNITS AND SUBSURFACE INFILTRATION

Project: 267 Great Road
Location: Acton, MA
Prepared For: Benjamin Ewing (Stamski & McNary, Inc.)

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1.0" of runoff.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given:

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)
DMH-2	0.09	0.0001406	5.0	0.083	1.00
DMH-3	0.24	0.0003750	5.0	0.083	1.00

Procedure:

Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Structure Name	qu (csm/in.)
DMH-2	795.00
DMH-3	795.00

1. Compute Q Rate using the following equation:

$$Q_1 = (qu)\ (A)\ (WQV)$$

where:

Q_1 = flow fate associated with first 1.0" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1.0" in this case)

Structure Name	Q_1 (cfs)
DMH-2	0.11
DMH-3	0.30

CDS ESTIMATED NET ANNUAL TSS REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

CONTECH ENGINEERED SOLUTIONS

CDS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-3

Area	0.24	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	minutes	CDS Treatment Capacity	
			1.4	cfs

Rainfall Intensity[1] (In/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.01	0.01	100.0	9.6
0.06	9.4%	29.3%	0.01	0.01	100.0	9.4
0.08	7.7%	37.0%	0.02	0.02	100.0	7.7
0.10	8.6%	45.6%	0.02	0.02	100.0	8.6
0.12	6.3%	51.9%	0.03	0.03	100.0	6.3
0.14	4.7%	56.5%	0.03	0.03	100.0	4.7
0.16	4.6%	61.2%	0.03	0.03	100.0	4.6
0.18	3.5%	64.7%	0.04	0.04	100.0	3.5
0.20	4.3%	69.1%	0.04	0.04	99.9	4.3
0.25	8.0%	77.1%	0.05	0.05	99.5	8.0
0.30	5.6%	82.7%	0.06	0.06	99.2	5.5
0.35	4.4%	87.0%	0.08	0.08	98.8	4.3
0.40	2.5%	89.5%	0.09	0.09	98.4	2.5
0.45	2.5%	92.1%	0.10	0.10	98.1	2.5
0.50	1.4%	93.5%	0.11	0.11	97.7	1.3
0.75	5.0%	98.5%	0.16	0.16	95.9	4.8
1.00	1.0%	99.5%	0.22	0.22	94.0	1.0
1.50	0.0%	99.5%	0.32	0.32	90.4	0.0
2.00	0.0%	99.5%	0.43	0.43	86.7	0.0
3.00	0.5%	100.0%	0.65	0.65	79.4	0.4
						99.4
					Removal Efficiency Adjustment[2] =	6.5%
					Predicted % Annual Rainfall Treated =	93.5%
					Predicted Net Annual Load Removal Efficiency =	**92.9%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL TSS REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-2

Area	0.09	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	minutes	CDS Treatment Capacity	
			1.4	cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.00	0.00	100.0	9.6
0.06	9.4%	29.3%	0.00	0.00	100.0	9.4
0.08	7.7%	37.0%	0.01	0.01	100.0	7.7
0.10	8.6%	45.6%	0.01	0.01	100.0	8.6
0.12	6.3%	51.9%	0.01	0.01	100.0	6.3
0.14	4.7%	56.5%	0.01	0.01	100.0	4.7
0.16	4.6%	61.2%	0.01	0.01	100.0	4.6
0.18	3.5%	64.7%	0.01	0.01	100.0	3.5
0.20	4.3%	69.1%	0.02	0.02	100.0	4.3
0.25	8.0%	77.1%	0.02	0.02	100.0	8.0
0.30	5.6%	82.7%	0.02	0.02	100.0	5.6
0.35	4.4%	87.0%	0.03	0.03	100.0	4.4
0.40	2.5%	89.5%	0.03	0.03	100.0	2.5
0.45	2.5%	92.1%	0.04	0.04	100.0	2.5
0.50	1.4%	93.5%	0.04	0.04	100.0	1.4
0.75	5.0%	98.5%	0.06	0.06	99.3	5.0
1.00	1.0%	99.5%	0.08	0.08	98.6	1.0
1.50	0.0%	99.5%	0.12	0.12	97.3	0.0
2.00	0.0%	99.5%	0.16	0.16	95.9	0.0
3.00	0.5%	100.0%	0.24	0.24	93.1	0.5
						99.9

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**93.5%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Groundwater Recharge Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860 - 267 GREAT RD. - ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/14
CHECKED BY _____ DATE _____
SCALE _____

REQUIRED RECHARGE VOLUME

$R_V = F \times$ IMP. AREA

F = 0.6" OVER IMPERVIOUS
AREA = 17,348 SF

$R_V = \frac{0.6''}{12} \times 17{,}348$ SF

$R_V = 868$ CF

SIZING STORAGE VOLUME (SIMPLE DYNAMIC METHOD)

$A = \frac{R_V}{D + KT}$ D = 4' K = 8.27 IN/HR T = 2 HR

$A = \frac{868 \text{ CF}}{4' + \left(\frac{8.27''}{12}\right) 2 \text{ HR}}$

A = 161.4 SF < 1,150.5 SF PROVIDED O.K.

V = A x D

V = 161.4 SF x 4'

V = 645.6 CF < 3,165 CF PROVIDED O.K.

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860-267 GREAT RD - ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/14
CHECKED BY _____ DATE _____
SCALE _____

72 HOUR DRAWDOWN

$$\text{TIME} = \frac{R_V}{K \times \text{BOTTOM AREA}}$$

$K = 8.27$ IN/HR AREA = 1,150.5 SF $R_V = 868$ CF

$$\text{TIME} = \frac{868 \text{ CF}}{\frac{8.27''}{12} \times 1{,}150.5 \text{ SF}}$$

TIME = 1.09 HOURS < 72 HOURS O.K.

TSS Removal Calculations

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Subcatchment P-4

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Contech CDS2015-4	92.9%	1.00	0.929	0.071

Total TSS Removal = 92.9%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 4860
Prepared By: WJH
Date: 6/27/14

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Subcatchment P-4

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Contech CDS2015-4	92.9%	1.00	0.929	0.071
Subsurface Infiltration Structure	80%	0.071	0.057	0.014

Total TSS Removal = 98.6%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 4860
Prepared By: WJH
Date: 6/27/14

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

Project: 267 Great Road
Location: Acton, MA
Prepared For: Benjamin Ewing (Stamski & McNary, Inc.)

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1.0" of runoff.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given:

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)
DMH-2	0.09	0.0001406	5.0	0.083	1.00
DMH-3	0.24	0.0003750	5.0	0.083	1.00

Procedure:

Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Structure Name	qu (csm/in.)
DMH-2	795.00
DMH-3	795.00

1. Compute Q Rate using the following equation:

$$Q_1 = (qu)\ (A)\ (WQV)$$

where:

Q_1 = flow fate associated with first 1.0" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1.0" in this case)

Structure Name	Q_1 (cfs)
DMH-2	0.11
DMH-3	0.30

CDS ESTIMATED NET ANNUAL TSS REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-3

Area	0.24	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	minutes	CDS Treatment Capacity	
			1.4	cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.01	0.01	100.0	9.6
0.06	9.4%	29.3%	0.01	0.01	100.0	9.4
0.08	7.7%	37.0%	0.02	0.02	100.0	7.7
0.10	8.6%	45.6%	0.02	0.02	100.0	8.6
0.12	6.3%	51.9%	0.03	0.03	100.0	6.3
0.14	4.7%	56.5%	0.03	0.03	100.0	4.7
0.16	4.6%	61.2%	0.03	0.03	100.0	4.6
0.18	3.5%	64.7%	0.04	0.04	100.0	3.5
0.20	4.3%	69.1%	0.04	0.04	99.9	4.3
0.25	8.0%	77.1%	0.05	0.05	99.5	8.0
0.30	5.6%	82.7%	0.06	0.06	99.2	5.5
0.35	4.4%	87.0%	0.08	0.08	98.8	4.3
0.40	2.5%	89.5%	0.09	0.09	98.4	2.5
0.45	2.5%	92.1%	0.10	0.10	98.1	2.5
0.50	1.4%	93.5%	0.11	0.11	97.7	1.3
0.75	5.0%	98.5%	0.16	0.16	95.9	4.8
1.00	1.0%	99.5%	0.22	0.22	94.0	1.0
1.50	0.0%	99.5%	0.32	0.32	90.4	0.0
2.00	0.0%	99.5%	0.43	0.43	86.7	0.0
3.00	0.5%	100.0%	0.65	0.65	79.4	0.4
						99.4
					Removal Efficiency Adjustment[2] =	6.5%
					Predicted % Annual Rainfall Treated =	93.5%
					Predicted Net Annual Load Removal Efficiency =	**92.9%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL TSS REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-2

Area	0.09	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	minutes	CDS Treatment Capacity	
			1.4	cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.00	0.00	100.0	9.6
0.06	9.4%	29.3%	0.00	0.00	100.0	9.4
0.08	7.7%	37.0%	0.01	0.01	100.0	7.7
0.10	8.6%	45.6%	0.01	0.01	100.0	8.6
0.12	6.3%	51.9%	0.01	0.01	100.0	6.3
0.14	4.7%	56.5%	0.01	0.01	100.0	4.7
0.16	4.6%	61.2%	0.01	0.01	100.0	4.6
0.18	3.5%	64.7%	0.01	0.01	100.0	3.5
0.20	4.3%	69.1%	0.02	0.02	100.0	4.3
0.25	8.0%	77.1%	0.02	0.02	100.0	8.0
0.30	5.6%	82.7%	0.02	0.02	100.0	5.6
0.35	4.4%	87.0%	0.03	0.03	100.0	4.4
0.40	2.5%	89.5%	0.03	0.03	100.0	2.5
0.45	2.5%	92.1%	0.04	0.04	100.0	2.5
0.50	1.4%	93.5%	0.04	0.04	100.0	1.4
0.75	5.0%	98.5%	0.06	0.06	99.3	5.0
1.00	1.0%	99.5%	0.08	0.08	98.6	1.0
1.50	0.0%	99.5%	0.12	0.12	97.3	0.0
2.00	0.0%	99.5%	0.16	0.16	95.9	0.0
3.00	0.5%	100.0%	0.24	0.24	93.1	0.5
						99.9
					Removal Efficiency Adjustment[2] =	6.5%
					Predicted % Annual Rainfall Treated =	93.5%
					Predicted Net Annual Load Removal Efficiency =	**93.5%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Storm Sewer Design

DESIGN STORM: 100 YEAR
DATE: 6/30/2014
DONE BY: BRE
FILE: 4860 RATIONAL METHOD.wb3

STORM SEWER DESIGN

(ADS N-12)"n"= 0.010 4"-10"
(ADS N-12)"n"= 0.012 12"-36"
(ADS N-12)"n"= 0.013 42"-60"
(Cast Iron)"n"= 0.011
(RCP)"n"=0.013

PROJECT: SM-4860
LOCATION: Acton, MA

FROM	TO	LENGTH (FT)	TRIBUTARY AREA		TIME OF FLOW		RUNOFF COEFF. "C"	RAINFALL INTENSITY (IN/HR)	"Q" TOTAL RUNOFF (CFS)	SLOPE of PIPE (FT/FT)	DIAM (IN)	MANN. "n"	CAPACITY FULL (CFS)	VELOCITY FULL (FPS)	DESIGN FLOW				MANHOLE INVERT DROP (FT)	FALL IN PIPE (FT)	DRAIN INV. ELEVATION		GROUND SURFACE	
			INCR. (ACRES)	TOTAL (ACRES)	TO UPPER END (MIN)	TIME IN SECTION (MIN)									VELOCITY (FPS)	VELOCITY HEAD (FT)	DEPTH OF FLOW (FT)	TOTAL ENERGY HEAD (FT)			UPPER END	LOWER END	UPPER END	LOWER END
CB-1	DMH-1	[illegible]	[illegible]	[illegible]	[illegible]	0.19	[illegible]	[illegible]	0.57	0.019	[illegible]	[illegible]	5.37	6.84	4.39	0.30	0.22	0.51		0.97	[illegible]	[illegible]	[illegible]	[illegible]
CB-2	DMH-1	[illegible]	[illegible]	[illegible]	[illegible]	0.20	[illegible]	[illegible]	0.60	0.010	[illegible]	[illegible]	3.85	4.91	3.55	0.20	0.27	0.46		0.43	[illegible]	[illegible]	[illegible]	[illegible]
DMH-1	DMH-2	[illegible]	[illegible]	[illegible]	[illegible]	0.38	[illegible]	[illegible]	0.80	0.010	[illegible]	[illegible]	3.85	4.91	3.55	0.20	0.27	0.46		0.81	[illegible]	[illegible]	[illegible]	[illegible]
DMH-2	INF-INLET	[illegible]	[illegible]	[illegible]	[illegible]	0.20	[illegible]	[illegible]	0.71	0.016	[illegible]	[illegible]	4.82	6.14	4.40	0.30	0.26	0.56		0.83	[illegible]	[illegible]	[illegible]	[illegible]
DMH-2	DMH-3	[illegible]	[illegible]	[illegible]	[illegible]	0.01	[illegible]	[illegible]	1.94	0.083	[illegible]	[illegible]	11.12	14.17	10.58	1.74	0.28	2.02		0.90	[illegible]	[illegible]	[illegible]	[illegible]
DMH-3	DMH-4	[illegible]	[illegible]	[illegible]	[illegible]	0.02	[illegible]	[illegible]	1.94	0.025	[illegible]	[illegible]	6.09	7.76	6.87	0.73	0.39	1.12		0.20	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]	[illegible]									[illegible]	[illegible]	[illegible]	[illegible]

CB - CATCH BASIN
DI - DROP INLET
DMH- DRAIN MANHOLE
INF - INFILTRATION AREA

Inlet Grate Capacity Calculations

Job: SM-4860
Project: 267 Great Road

Calculated by: JTM
Date: 6/27/2014

LeBARON FOUNDRY, INC. LF246 inlet grate pass area A = 225 sq. in.
1.56 sq. ft.

Q = (C*A* SQRT(2*g*h))*f

C = orifice coefficient
C = 0.6 square edges
A = inlet area
A = 1.56 sq. ft.
g = gravitational constant
g = 32.2 ft/sec^2
h = head on inlet
h = 0.33 ft. (low points)
0.17 ft. (on slope)
f = clogging factor
f = 0.66

Single Grate
Q (MAX)= 2.85 cfs (LP) low points LF246
Q (MAX)= 2.04 cfs (OS) on slope LF246
Double Grate
Q (MAX)= 5.70 cfs (LP) low points LF246
Q (MAX)= 4.09 cfs (OS) on slope LF246

	TRIBUTARY AREA (AC)	TIME OF CONC.	100 YR INTENSITY	C	Q=CiA Q100	POSITION	Q (MAX)	single grate	double grate
CB1	0.10	10	7.6	0.75	0.59	LP	2.85	yes	
CB2	0.40	10	7.6	0.64	1.81	LP	2.85	yes	

Soil Evaluation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Site Address or Map/Lot Number

C. On-Site Review (minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 3/27/12 (Date) 9:30 (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) 0-5% (Slope (%))

GARDEN (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 100 feet

Property Line 710 feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 103" Depth Standing Water in Hole 103"

Estimated Depth to High Groundwater: 78" (Inches) _____ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

267 GREAT ROAD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
0-16"	A	10YR 2/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
16"-30"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
30"-11	C	2.5Y 6/4	78"	7.5YR 6/4	5%	SAND	—	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Site Address or Map/Lot Number

C. On-Site Review (minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 3/27/12 (Date) 8:45 (Time) SUNNY (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-3 Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) 0-5% (Slope (%))

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 100 feet

Property Line >10 feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 77" Depth Standing Water in Hole 84"

Estimated Depth to High Groundwater: 72" (inches) _____ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

267 GREAT ROAD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
0-12"	A	10YR 3/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
12"-28"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
28"-10'	C	2.5Y 6/4	72"	7.5YR 4/4	5%	SAND	5%	—	SG	LOOSE	

Additional Notes GRAVEL STARTS @ 9'

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Site Address or Map/Lot Number

C. On-Site Review (minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 3/27/12 (Date) 9:15 (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) 5-10% (Slope (%))

GRASS / TREES (Vegetation) _____ (Landform) OF - SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area >100 feet

Property Line >100' feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 108" (inches) _____ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

267 GREAT ROAD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: T1-5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
0-12"	A	10YR 3/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
12"-30"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
30"-10'	C	2.5Y 6/4	108"	7.5YR 5/2	5%	COARSE SAND	10%	2%	SG	LOOSE	

Additional Notes: CAVING IN @ 8'

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Site Information

Owner Name

267 GREAT ROAD
Street Address or Lot #

ACTON — MA — 01720
City/Town — State — Zip Code

Contact Person (if different from Owner) — Telephone Number

B. Test Results

	Date / Time	Date / Time
	3/27/12	3/27/12
Observation Hole #	PT-A	PT-P
Depth of Perc	52"	54"
Start Pre-Soak		
End Pre-Soak	UTS	UTS
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	<2 MPI	<2 MPI
Test Passed:	☒	☒
Test Failed:	☐	☐

Test Performed By: STAMSKI AND McNARY, INC (BENJAMIN FWING)

Witnessed By: ACTON BOARD OF HEALTH (JUSTIN SNAIR)

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Site Information

Owner Name

Street Address or Lot #: 267 GREAT ROAD

City/Town: ACTON | State: MA | Zip Code: 01720

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date: 3/27/12 Time: 9:30	Date: 3/27/12 Time:
Observation Hole #	PT-C	PT-D
Depth of Perc	48"	56"
Start Pre-Soak	9:30	9:45
End Pre-Soak	UTS	UTS
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	<2 MPI	<2 MPI
	Test Passed: ☒ Test Failed: ☐	Test Passed: ☒ Test Failed: ☐

Test Performed By: STAMSKI AND McNARY, INC (BENJAMIN FENING)

Witnessed By: ACTON BOARD OF HEALTH (JUSTIN SNAIR

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Site Information

Owner Name

Street Address or Lot # 267 GREAT ROAD

City/Town ACTON State MA Zip Code 01720

Contact Person (if different from Owner)

Telephone Number

B. Test Results

Date	3/27/12	3/27/12
Time	10:00	10:15
Observation Hole #	PT-E	PT-F
Depth of Perc	52"	50"
Start Pre-Soak	10:00	10:15
End Pre-Soak	UTS	UTS
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	<2 MPI	<2 MPI
Test Passed:	☒	☒
Test Failed:	☐	☐

Test Performed By: STAMSKI AND McNARY, INC. (BENJAMIN EWING)

Witnessed By: ACTON BOARD OF HEALTH (JUSTIN SNAIR)

Comments:

Drainage Maps

3.7 WATER BALANCE CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Water Balance Calculations

SM-4860

Project: 267 Great Road | By: JTM | Date: 6/27/2014

Location: Acton MA | Checked: | Date:

Pre-Development Recharge

CN=	36.4					
From Figure 1, infiltration=	20	in/year				
Drainage Area=	97,574	s.f.				
Recharge=	97,574	x	20	/12 in/ft	162,624	c.f./year

Pre-Development Sewage Flow

Leaching Area=	330	gpd						
Total Design Flow=	330	gpd						
330	gpd x	365	days/year x	0.134	s.f./gal =	16,101	c.f./year	
					Average(50%)=	8,050	c.f./year	

Post-Development Recharge

CN=	46.6					
From Figure 1, infiltration=	19.7	in/year				
Drainage area=	97,574	s.f.				
Recharge=	97,574	x	19.7	/12 in/ft	160,185	c.f./year

Post-Development Sewage Flow

Leaching Area=	270	gpd						
Total Design Flow=	270	gpd						
270	gpd x	365	days/year x	0.134	s.f./gal =	13,173	c.f./year	
					Average(50%)=	6,587	c.f./year	

Post-Development Subsurface Infiltration

CN=	98					
From Figure 1, runoff=	30.6	in/year (directed to drywells)				
Impervious Area	17,424	s.f.				
Recharge=	17,424	x	30.6	/12 in/ft	44,431	c.f./year

Post-Development	Vs.	Pre-Development
211,203	>	170,674
c.f./year		c.f./year

Worksheet 2: Runoff curve number and runoff SM-4860

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed PRE

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			1.60	47.97
A	Open	39			0.45	17.47
	Impervious	98			0.07	6.37
A	Gravel	76			0.13	9.65
					Totals =	2.24	81.46

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{81.46}{2.24} =$ 36.38 ; Use CN = 36.4

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	2.7	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.01	0.05	0.41
Runoff, Q.....	cf	75	442	3360

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/3/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] POST

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
A	Woods	30			1.08	32.34
A	Open	39			0.69	26.83
	Impervious	98			0.34	33.32
A	Gravel	76			0.05	3.72
	Roof	98			0.08	7.84
				Totals =	2.24	104.06

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{104.06}{2.24} =$ 46.56 ; Use CN = 46.6

2. Runoff

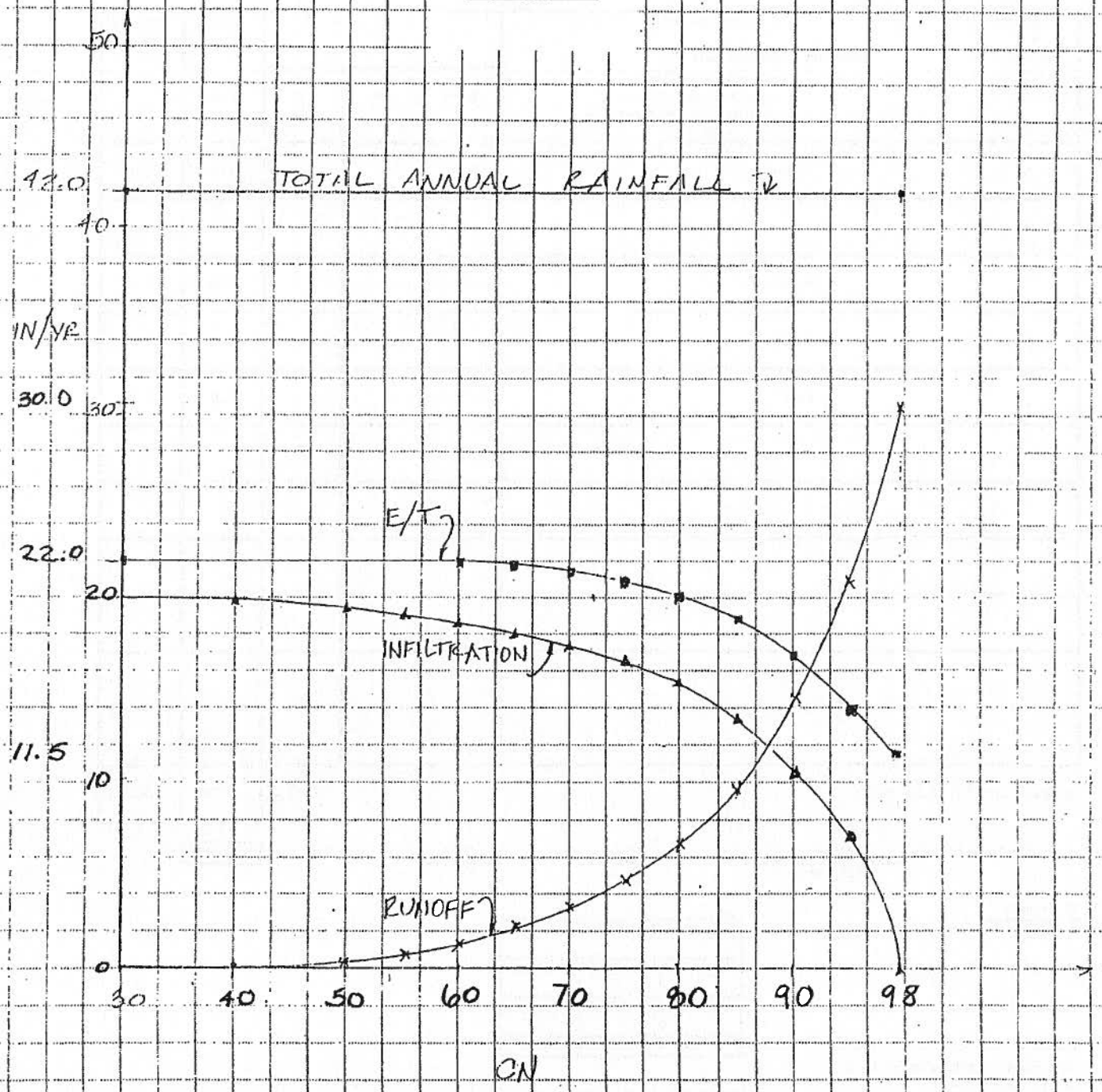
		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	2.1	4.5	6.4
Runoff, Q.....	in	0.05	0.36	1.08
(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)				
Runoff, Q.....	cf	427	2881	8770

D-2 (210-VI-TR-55, Second Ed., June 1986)

STAMSKI AND McNARY, INC.
80 Harris Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Figure 1



NOTE: GRAPH COMPILED FROM DATA PUBLISHED BY NOAA (1984-1988)
(SEE REPORT FROM STAMSKI & MCNARY INC SUBMITTED W/ TOWN OF ACTON ENG. DEPT.)

3.8 EARTH REMOVAL CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Cut/Fill Calculations

Location: 267 Great Road
Acton
Job: SM-4860

Calculated by: BRE
Date: 6/5/2014

Method:	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Grid	838	1591	753
Composite	880	1690	810
Average End	906	1672	766

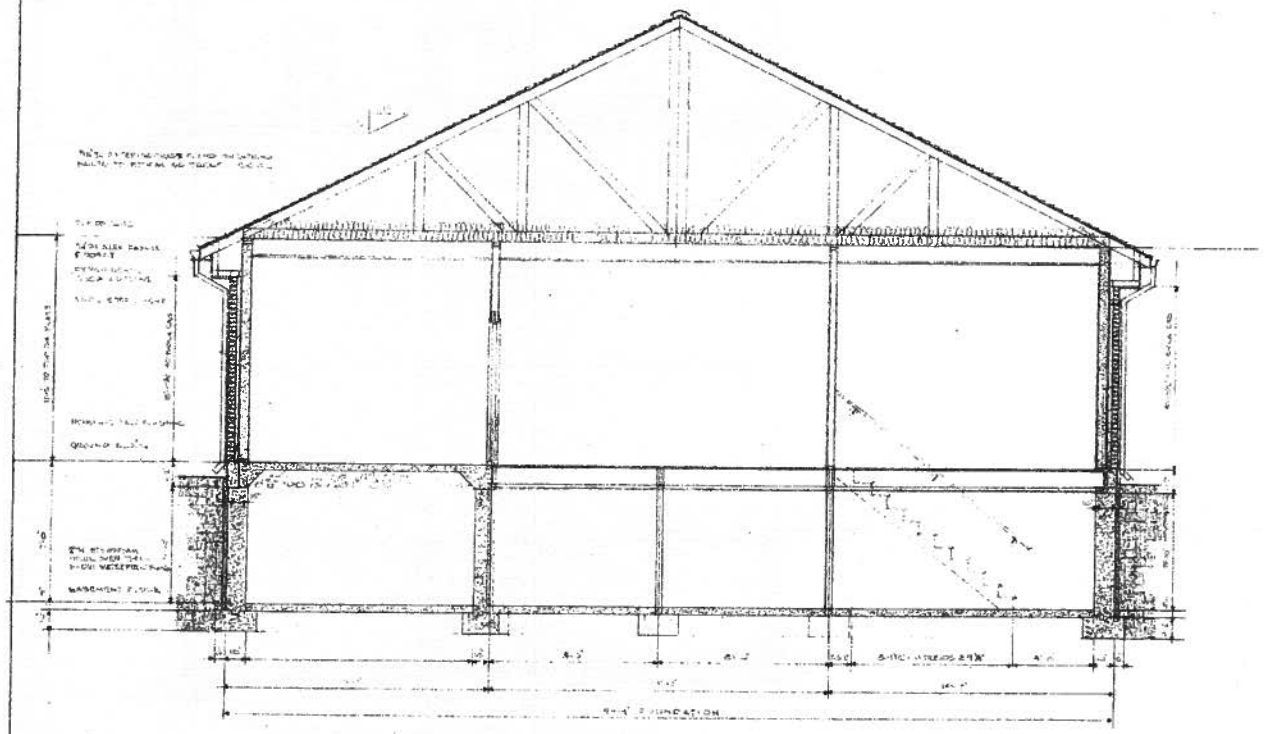
Average: 776 cubic yard of Fill

3.9 PLANS

Attached plans include: Title Sheet, Existing Conditions Plan, Layout Plan, Grading plan, Drainage & Utilities Plan, Detail Sheet - By: Stamski & McNary, Inc.

Landscape Plan – By: Kim Ahern Landscape Architects

FLOOR PLANS



CROSS SECTION A–A

SCALE: 1/8" = 1'-0"

REVISIONS		
NO.	DATE	DESCRIPTION

E.J. REMPELAKIS ASSOCIATES ARCHITECTS

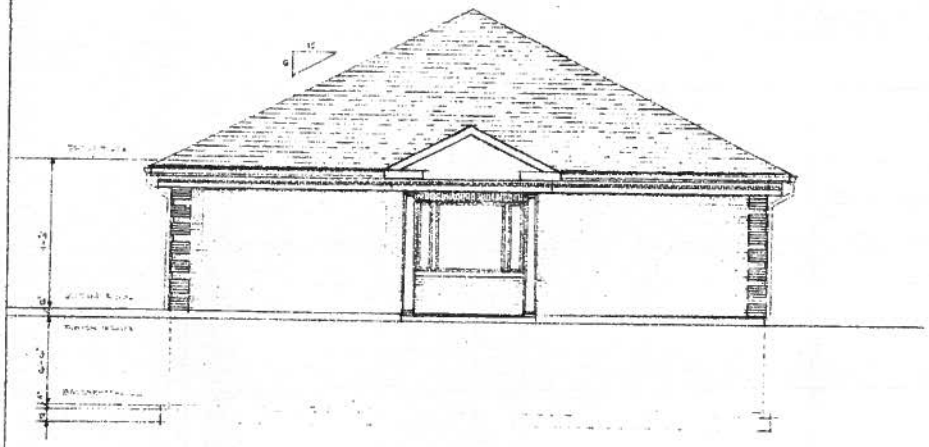
SUITE 201 173 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE

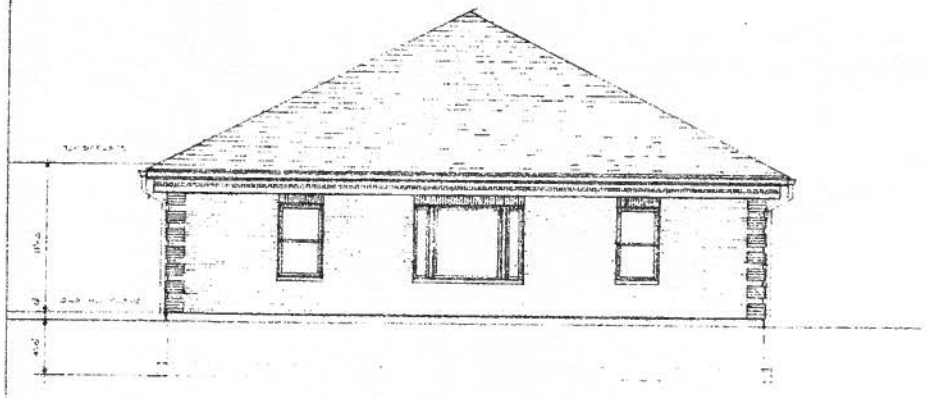
DATE

DR. CK.

PROJ. NO.



FRONT ELEVATION



REAR ELEVATION

REVISIONS

No	DATE	DESCRIPTION

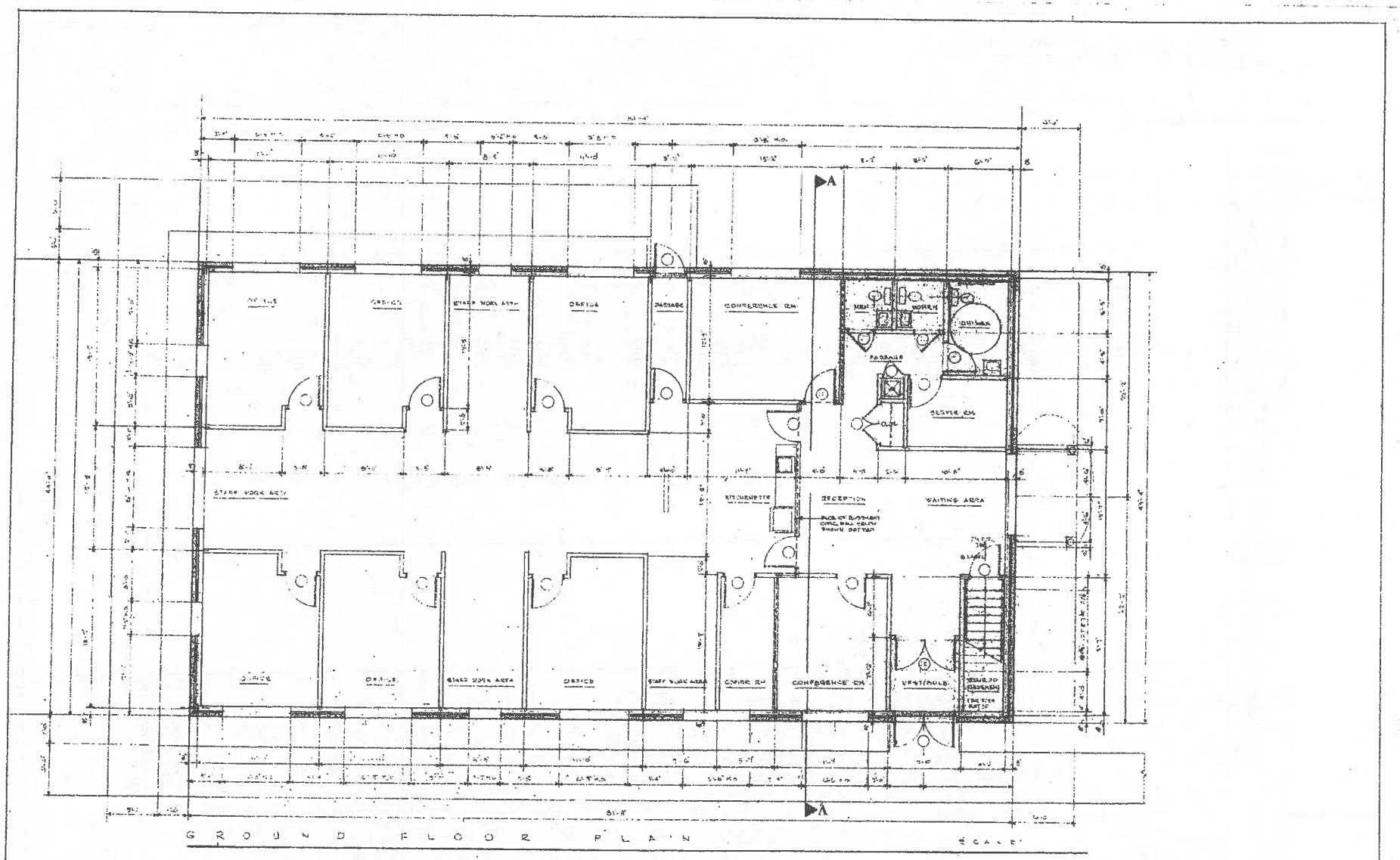
E.J. REMPELAKIS ASSOCIATES ARCHITECTS

SUITE 291 175 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE

DATE

DWG. JOB.



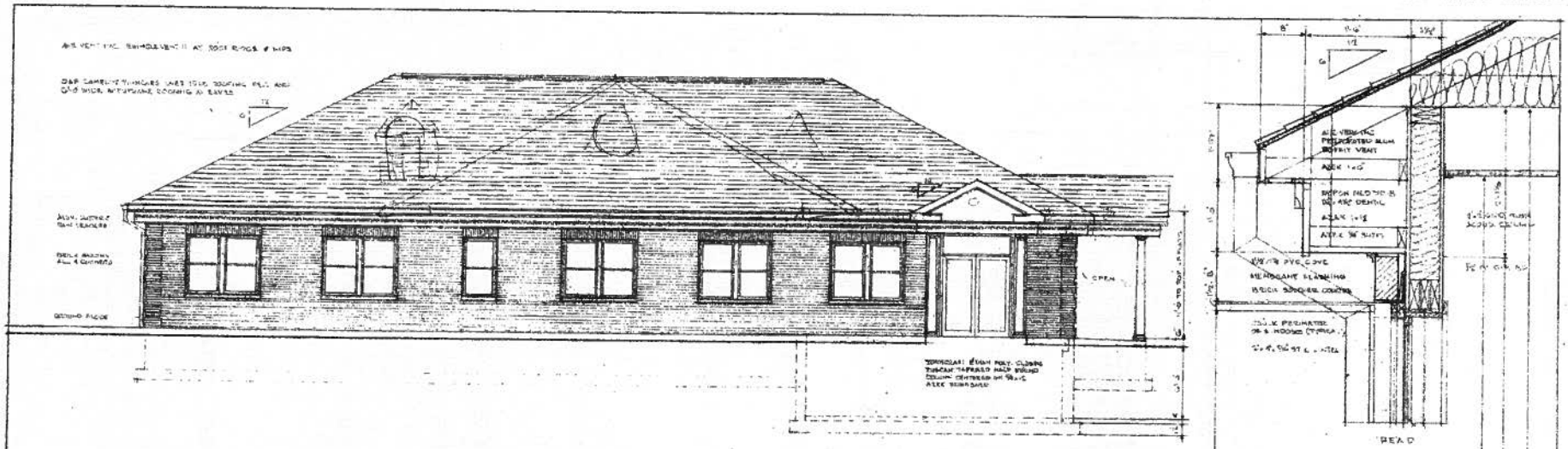
GROUND FLOOR PLAN

SCALE:

REVISIONS		
No.	DATE	LOCATION

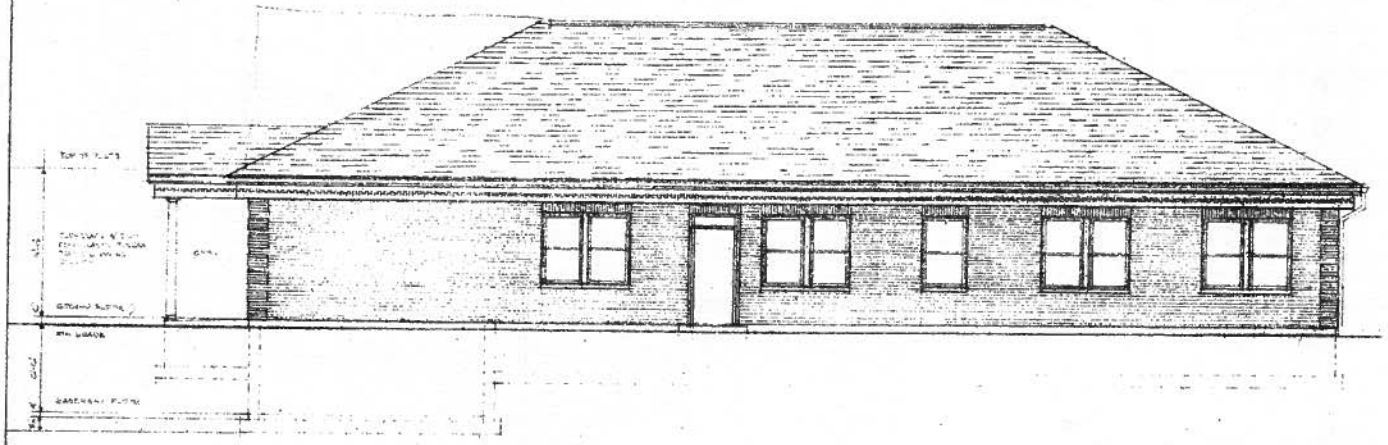
B.J. REMPELAKIS ASSOCIATES ARCHITECTS
SUITE 281 170 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE:
DATE:
DR. CK.
PROJ. NO.



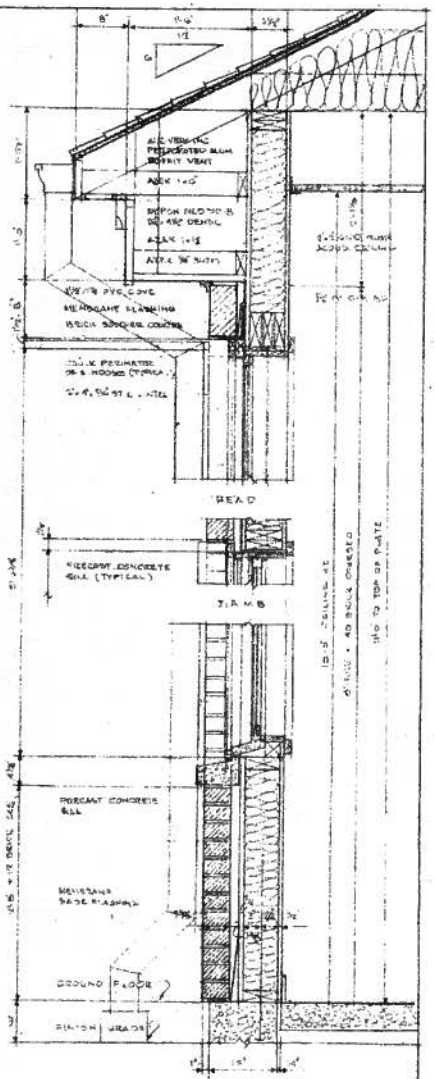
LEFT SIDE ELEVATION

SCALE: 1/4" = 1'0"



RIGHT SIDE ELEVATION

SCALE: 1/4" = 1'0"



WALL SECTION

SCALE: 1/4" = 1'0"

REVISIONS		
NO.	DATE	DESCRIPTION

E.J. REMPELAKIS ASSOCIATES ARCHITECTS

SUITE 201 179 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE

DATE

DR. CK.

PROJ. NO. 2014-9

REDUCED PLANS

3.9.10
Lighting Plan

INDEPEN[illegible] LIGHTIN[illegible] BUILTING [illegible]
51 cher[illegible] [illegible]ay Hill,
Hemmingf[illegible], Quebec
Canada, J[illegible]
Tel: 450[illegible]
techno@[illegible]techno.com
www.ec[illegible]techno.com

Lighting Calculation Study

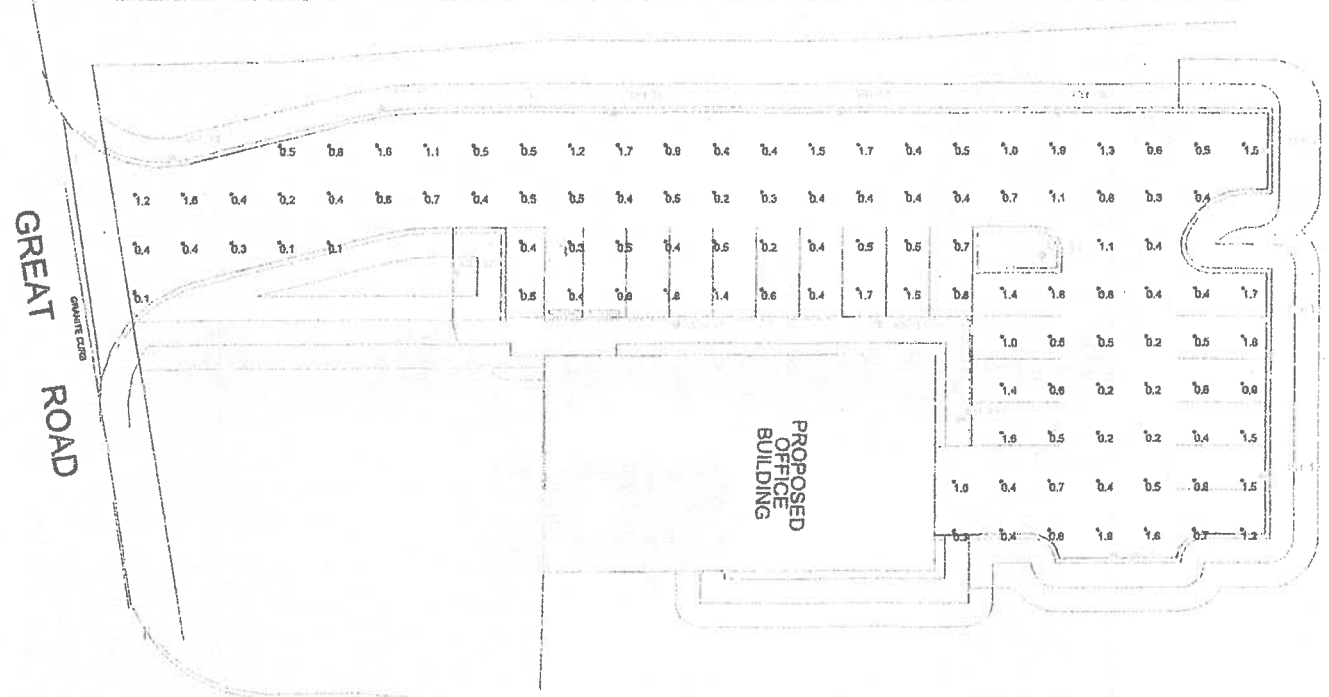
Dals Li[illegible] Inc., 30 Rol[illegible] Bière, S[illegible]
Blainvil[illegible] Quebec, J7C 5[illegible]

DISCLAIMER: [illegible]

Project name : 11187 Acton Parking Lot	Date:6/14/2014
Prepared for: Juan Ernesto Quintana	AGi32 Version 15.1.13
Filename: Acton Parking lot.AGI	Total Time (Hrs): 1.18
By : Cynthia Primeau Lapierre — Units:	Page 1 of 8

dals

Luminaire Schedule								
Symbol	Qty	Label	Description	Lum. Lumens	Lum. Watts	LLF	Filename	Arrangement
	14	G084C(1)(1)	G084C(1)(1)	1612	27.09	0.900	G084C(1)(1).IES	SINGLE



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Luminance	Fc	0.74	1.9	0.1	7.40	19.00

Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

DISCLAIMER: Calculations have been performed according to IESNA & CIE standards and goodpractice. Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lightingcalculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

Project name : 11187 Acton Parking Lot

Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

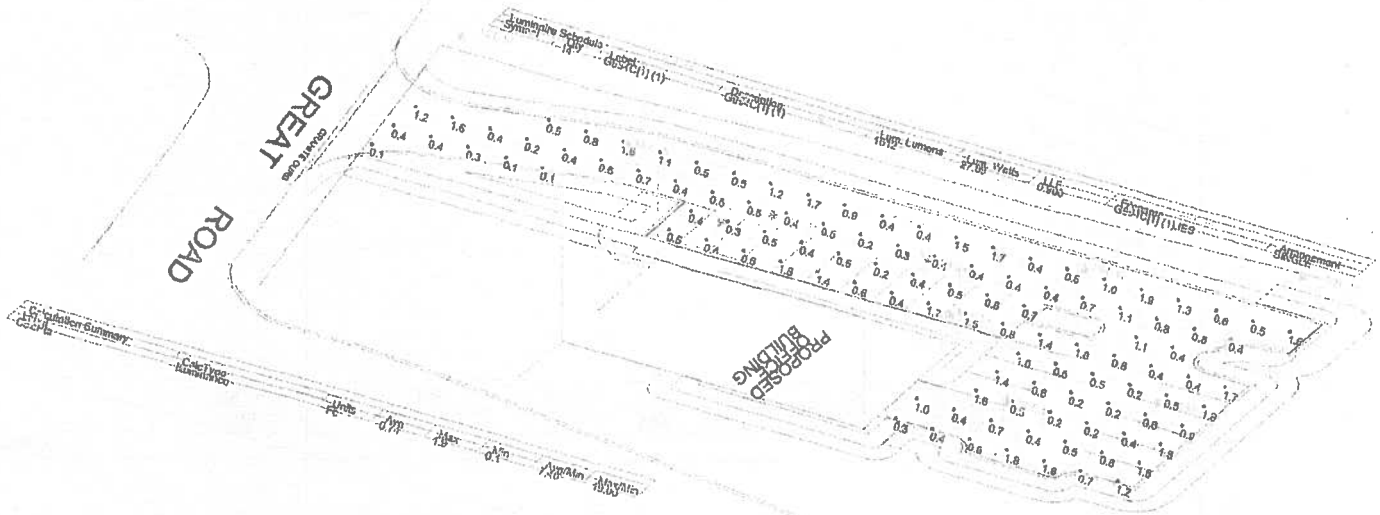
By : Cynthia Primeau Laplante

Units:

Date:8/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.18



Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

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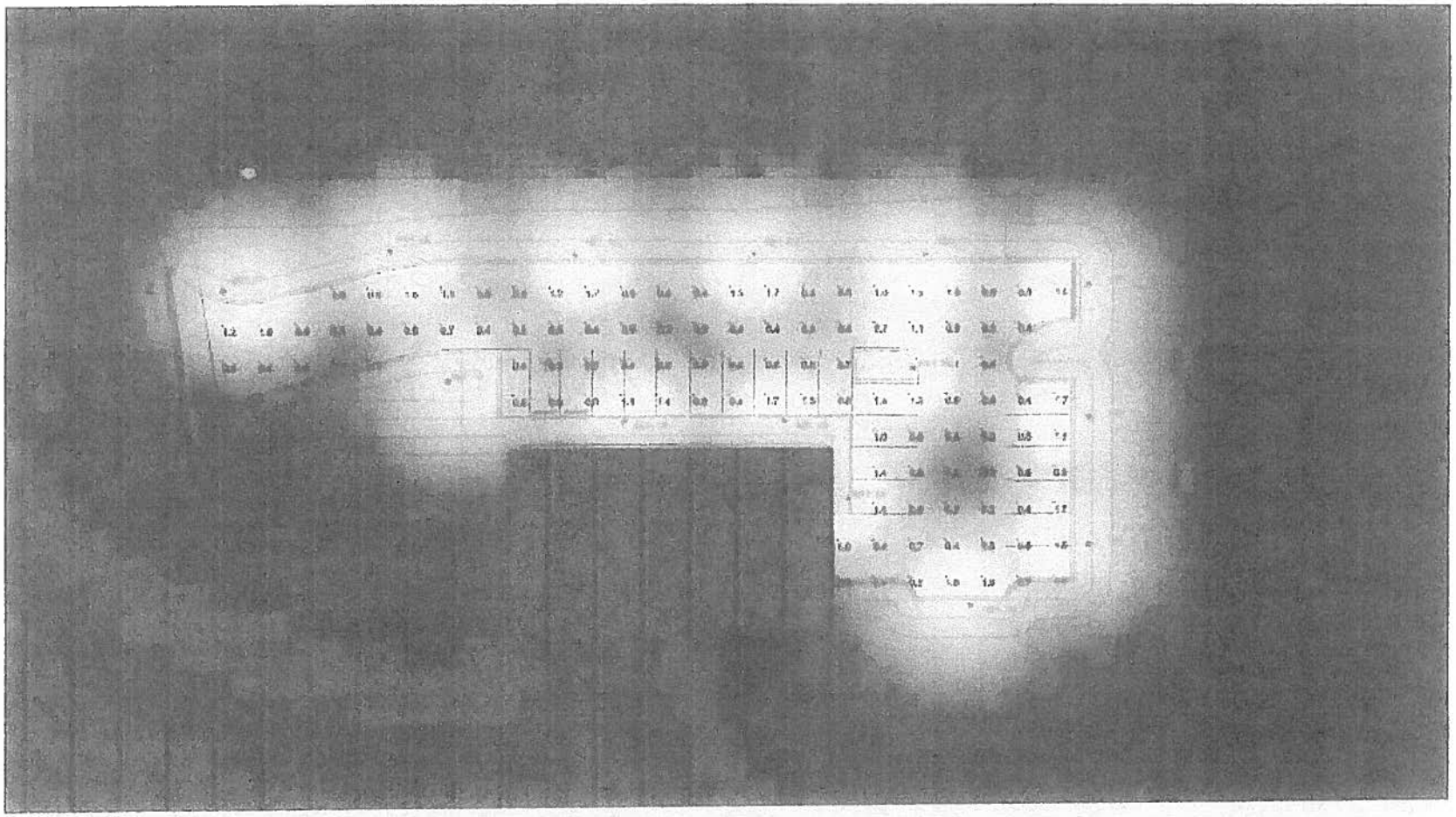
Prepared for: Juan Ernesto Quintana	AGI32 Version 15.1.13
Filename: Acton Parking lot.AGI	Total Time (Hrs.): 1.16
By : Cynthia Primeau Laplante / Units:	Page 3 of 8

dals

Results Summary

Luminaire Schedule							
Symbol	Qty	Label	Description	Lum. Watts	Lum. Lumens	LLF	Filename
	14	G994C[1] (1)	G994C[1] (1)	27.09	1612	0.900	G994C[1] (1).IES

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Illuminance	Fc	0.74	1.9	0.1	7.40	19.00



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Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

By : Cynthia Primeau Laplante

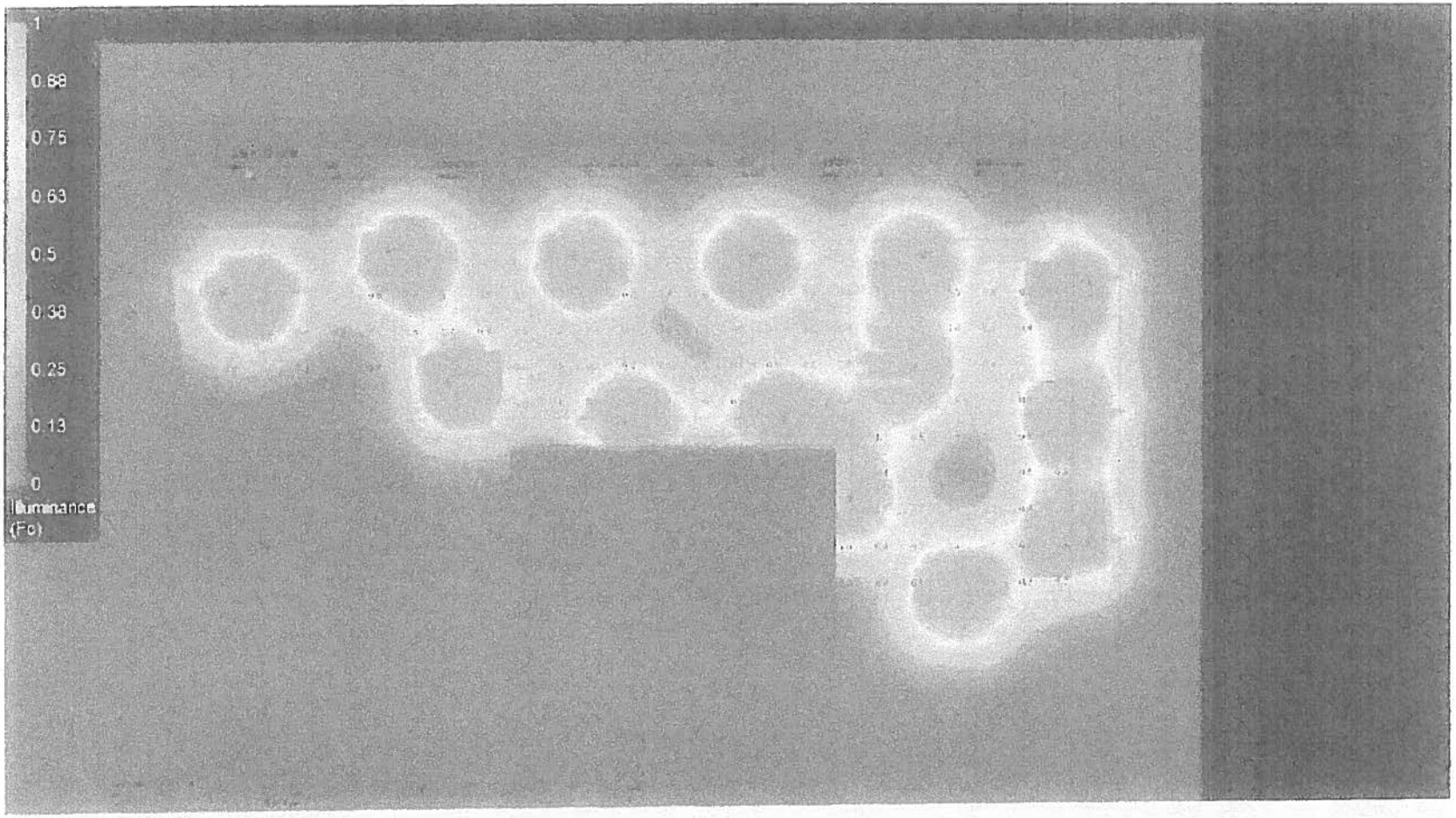
Units:

Date:6/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.18

dals



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Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

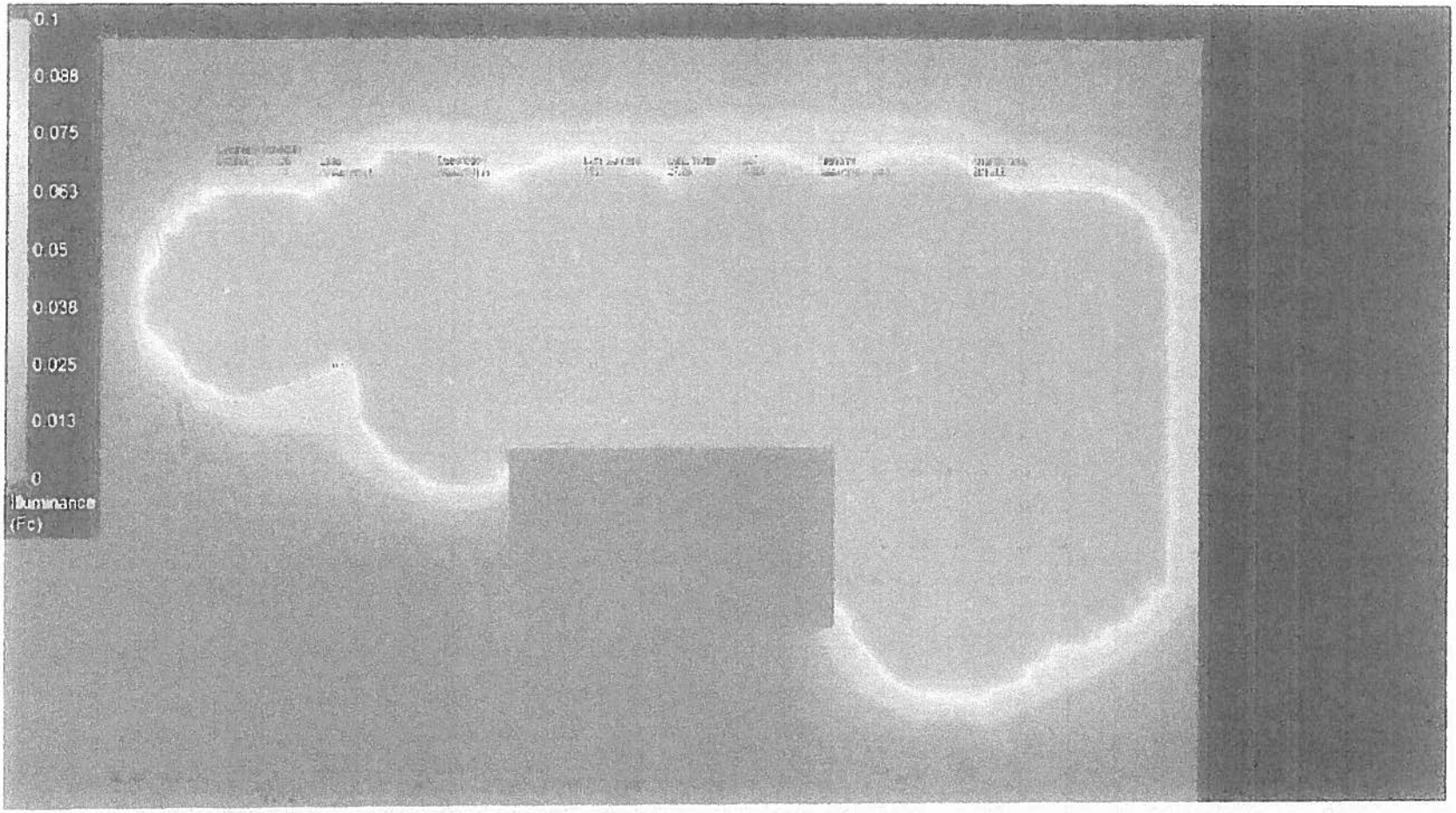
By : Cynthia Primeau Laplante

Units:

Date:6/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.18



Dais Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

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Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

By : Cynthia Primeau Laplante

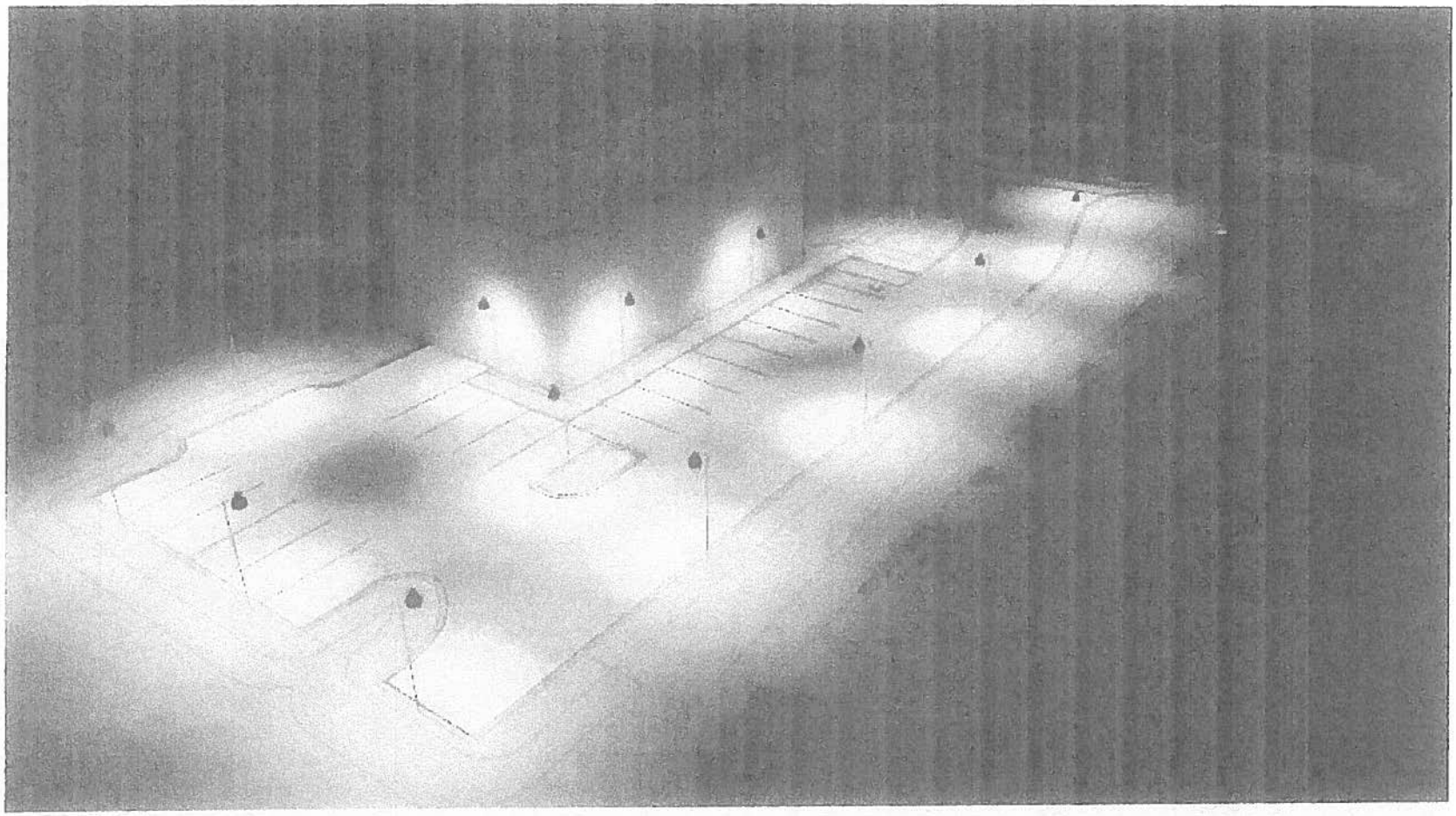
Units:

Date:6/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.10

dals



Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
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Project name : 11187 Acton Parking Lot

Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

By : Cynthia Primeau Laplante

Units:

Date:9/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.16

3.10
Traffic Study

Traffic Study

The proposed office building will produce a maximum of 6.5 trips during a peak hour and 41.67 trips during a weekday. Since the proposed office building will produce less than 30 trips in a peak hour and less than 400 trips on a weekday, this project is not subject to a traffic impact study.

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 267 Great Rd
SHEET NO. _____ OF _____
CALCULATED BY JTM DATE _____
CHECKED BY _____ DATE _____
SCALE _____

TRAFFIC STUDY

A.M. Peak hour
Average rate / 1000 S.F = 1.8
3605/1000 = 3.6
3.6 x 1.8 = 6.5 Trips

P.M. Peak hour
Average rate / 1000 S.F = 1.73
3605 / 1000 = 3.6
3.6 x 1.73 = 6.23 Trips

Weekday
Average rate / 1000 S.F. = 11.57
3605/1000 = 3.6
3.6 x 11.57 = 41.67

☆ AVERAGE RATES FROM INSTITUTE OF TRANSPORTATION ENGINEERS, TRIP GENERATION 7th EDITION VOLUME 3 OF 3.

SITE PLAN
FOR
ACTON MANAGEMENT, INC.
267 GREAT ROAD
ACTON, MASSACHUSETTS

DATE: JUNE 27, 2014

INDEX

SHEET 1	TITLE SHEET
SHEET 2	EXISTING CONDITIONS PLAN
SHEET 3	GRADING & DRAINAGE PLAN
SHEET 4	LAYOUT PLAN
SHEET 5-6	CONSTRUCTION DETAILS

LOCUS PLAN

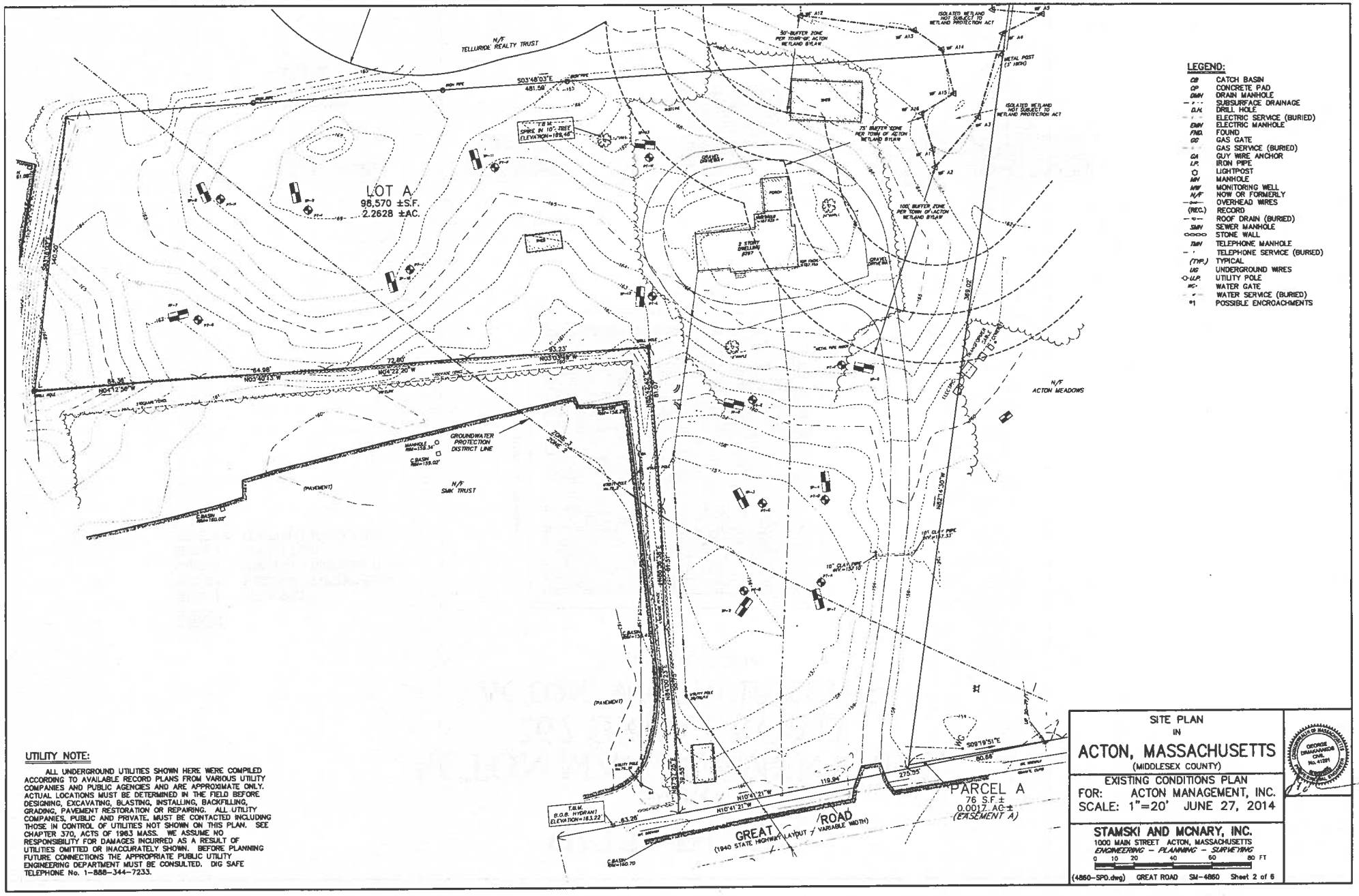
RECORD OWNER:
SPS-ACTON, LLC

APPLICANT:
ACTON MANAGEMENT, INC.
P.O. BOX 2350, 69 GREAT ROAD
ACTON, MA

ZONING DISTRICT:
LIMITED BUSINESS
GROUNDWATER PROTECTION DISTRICTS
ZONES 2 AND 3

REFERENCES:
MIDDLESEX REGISTRY OF DEEDS
SOUTH DISTRICT
TOWN MAP E5 PARCEL 13
DEED BOOK 59933 PAGE 547
DEED BOOK 60658 PAGE 414
PLAN No. 269 OF 1933
PLAN No. 878 OF 2012

ENGINEER/SURVEYOR
STAMSKI AND MCNARY, INC
1000 MAIN STREET
ACTON, MASSACHUSETTS 01720
(978) 263-8585



UTILITY NOTE:

ALL UNDERGROUND UTILITIES SHOWN HERE WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION OR REPAIRING. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE CONTACTED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. SEE CHAPTER 370, ACTS OF 1963 MASS. WE ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS THE APPROPRIATE PUBLIC UTILITY ENGINEERING DEPARTMENT MUST BE CONSULTED. DIG SAFE TELEPHONE No. 1-888-344-7233.

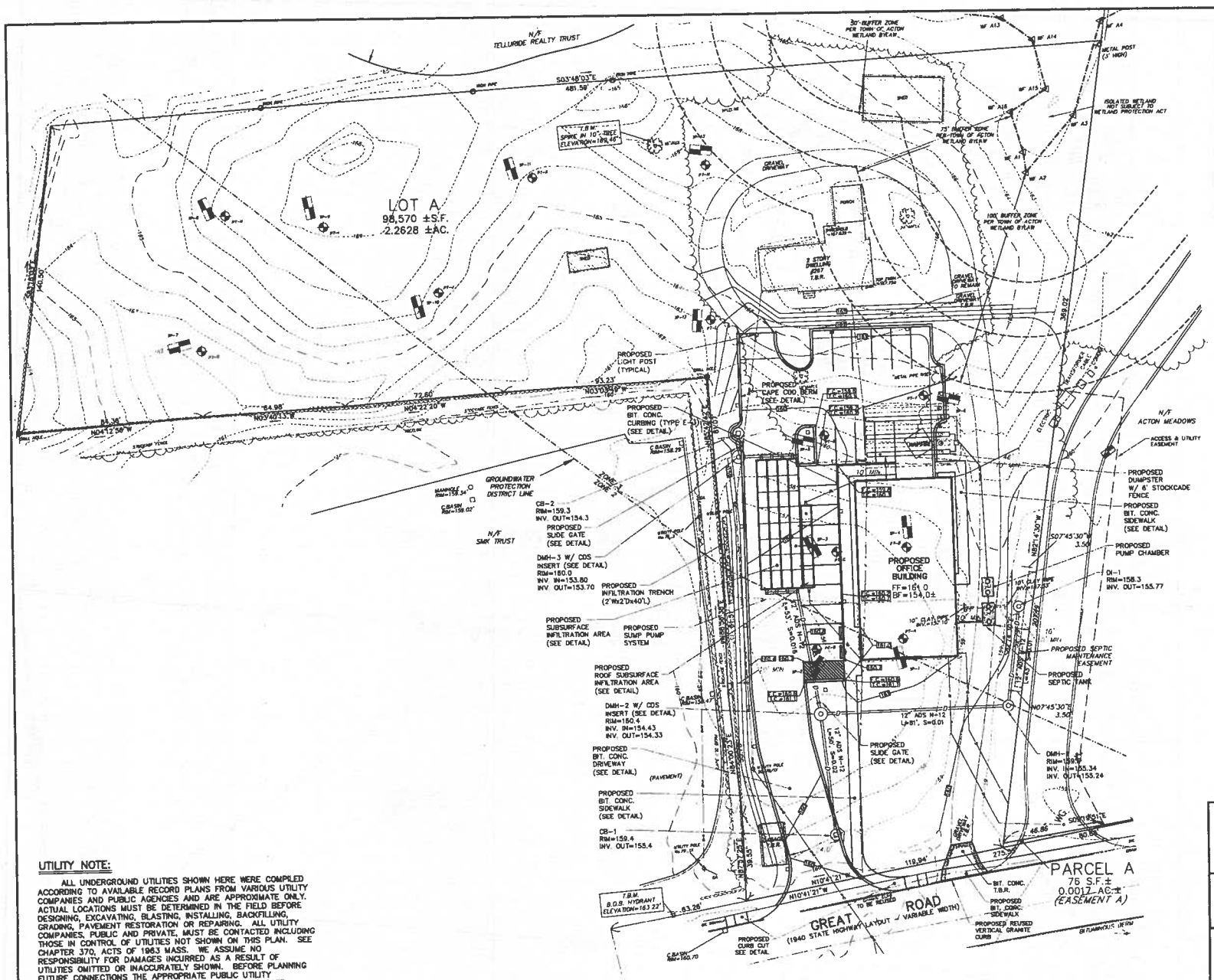
SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING CONDITIONS PLAN
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=20' JUNE 27, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING
0 10 20 40 60 80 FT

(4860-SPD.dwg) GREAT ROAD SM-4860 Sheet 2 of 6

COMMONWEALTH OF MASSACHUSETTS
GEORGE DRAKAKANDIS
CIVIL
NO. 41291
PROFESSIONAL ENGINEER



LEGEND:

CB	CATCH BASIN
CP	CONCRETE PAD
DMH	DRAIN MANHOLE
— s —	SUBSURFACE DRAINAGE
D.H.	DRILL HOLE
— e —	ELECTRIC SERVICE (BURIED)
EMH	ELECTRIC MANHOLE
FND.	FOUND
GG	GAS GATE
— g —	GAS SERVICE (BURIED)
GA	GUY WIRE ANCHOR
I.P.	IRON PIPE
○	LIGHTPOST
MH	MANHOLE
MW	MONITORING WELL
N/F	NOW OR FORMERLY
—ohw—	OVERHEAD WIRES
(REC.)	RECORD
— d —	ROOF DRAIN (BURIED)
SMH	SEWER MANHOLE
○○○○	STONE WALL
TMH	TELEPHONE MANHOLE
— t —	TELEPHONE SERVICE (BURIED)
(TYP.)	TYPICAL
UG	UNDERGROUND WIRES
-O-U.P.	UTILITY POLE
WG	WATER GATE
— w —	WATER SERVICE (BURIED)
*1	POSSIBLE ENCROACHMENTS

UTILITY NOTE:

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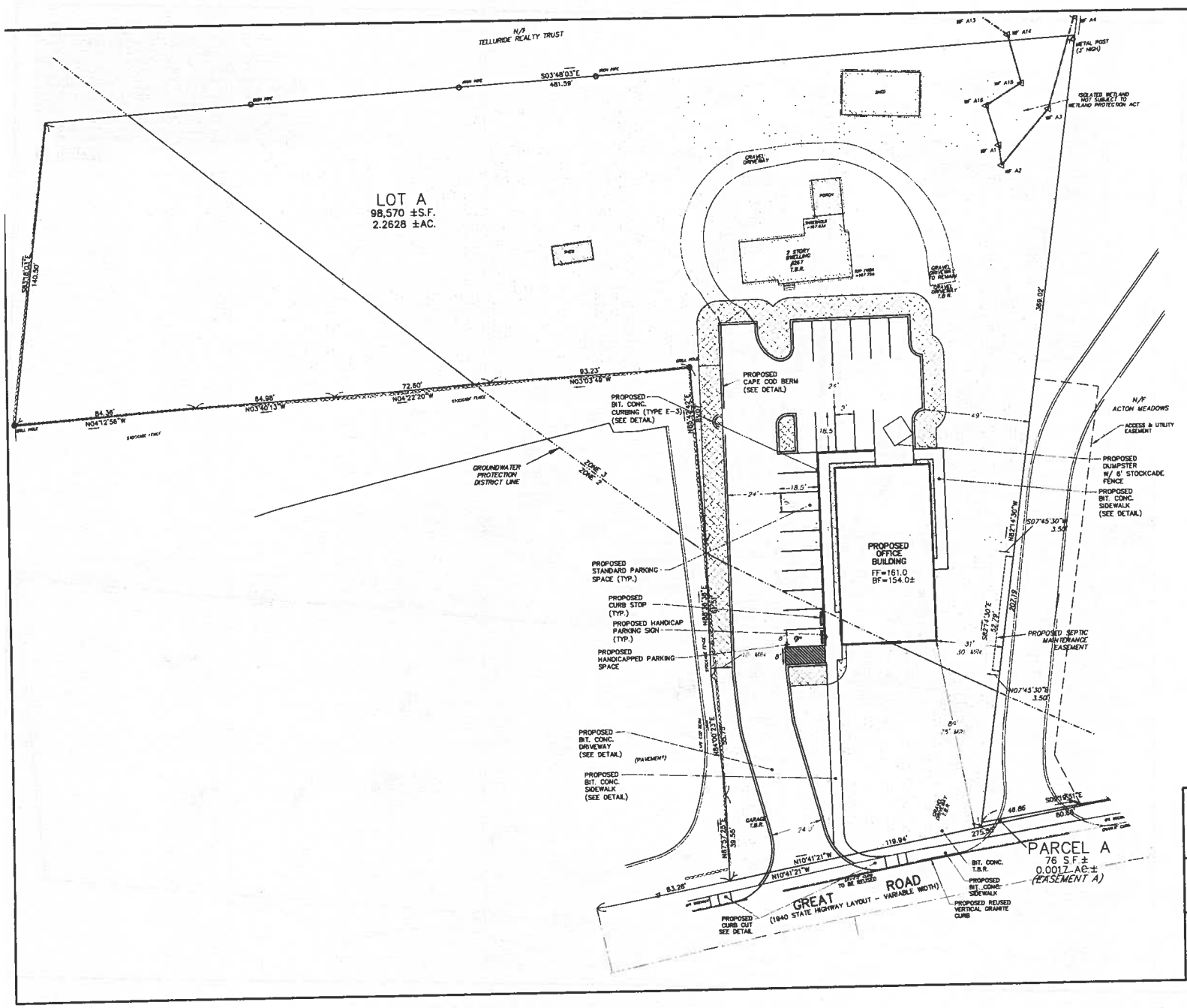
SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

GRADING AND DRAINAGE PLAN
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=20' JUNE 27, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING
0 10 20 40 60 80 FT

(4860-SPD.dwg) GREAT ROAD SM-4860 Sheet 3 of 6

COMMONWEALTH OF MASSACHUSETTS
GEORGE DIMAKARAKOS
CIVIL
No. 41321
REGISTERED PROFESSIONAL ENGINEER



LEGEND:

CB	CATCH BASIN
CP	CONCRETE PAD
DMH	DRAIN MANHOLE
— d —	SUBSURFACE DRAINAGE
D.H.	DRILL HOLE
— e —	ELECTRIC SERVICE (BURIED)
EMH	ELECTRIC MANHOLE
FND.	FOUND
GG	GAS GATE
— g —	GAS SERVICE (BURIED)
GA	GUY WIRE ANCHOR
I.P.	IRON PIPE
	LIGHTPOST
MH	MANHOLE
MW	MONITORING WELL
N/F	NOW OR FORMERLY
— ohw —	OVERHEAD WIRES
(REC.)	RECORD
— r —	ROOF DRAIN (BURIED)
SMH	SEWER MANHOLE
○○○○	STONE WALL
TMH	TELEPHONE MANHOLE
— t —	TELEPHONE SERVICE (BURIED)
(TYP.)	TYPICAL
UG	UNDERGROUND WIRES
U.P.	UTILITY POLE
WG	WATER GATE
— w —	WATER SERVICE (BURIED)
	PERIMETER LANDSCAPING
	OPEN SPACE

LAND USE DATA

ZONING REQUIREMENTS

ZONING DISTRICT:	LIMITED BUSINESS (LB)	
	REQUIRED:	PROVIDED:
MIN LOT AREA:	20,000 SF	98,646 SF
MIN LOT FRONTAGE:	200 FT	200.6 FT
MIN LOT WIDTH:	50 FT	> 50 FT
MIN FRONT YARD:	75 FT	> 75 FT
MIN SIDE & REAR YARD:	30 FT	31 FT
MIN OPEN SPACE: LOT AREA IN ZONE 2: 31,087 SF		
LOT AREA IN ZONE 3: 67,579 SF		
GWPD ZONE 2:	70% (21,747 SF)	82% (25,426)
GWPD ZONE 3:	50% (33,790 SF)	75% (50,561)
MIN UNDISTURBED OPEN SPACE:		
GWPD ZONE 2:	40% (12,427 SF)	56% (17,453)
MAX. IMPERVIOUS COVERAGE:		
GWPD ZONE 2:	30% (9,320 SF)	19% (5,791)

FLOOR AREA REQUIREMENTS

LOT AREA = (ROW) (WET)	98,646 SF
DEVELOPABLE SITE AREA (DSA) = 98,646-76-1,086=	97,484 SF
MAX NET FLOOR AREA ALLOWED 0.2 x 97,484 =	19,496 SF
PROPOSED NET FLOOR AREA =	3,605 SF
PROPOSED OFFICE NET FLOOR AREA =	3,605 SF
PROPOSED NET FLOOR AREA RATIO =	0.04

PARKING REQUIREMENTS:
(FROM SECTION 5.4.6.2)
MAXIMUM # PARKING SPACES:
1 SPACE / 3,000 SF OF DSA X 97,484 SF = 32 SPACES

(FROM SECTION 6.3.1)
OFFICE USE .
1 SPACE / 250 SF OF NFA x 3,600 SF = 14 SPACES

NUMBER OF SPACES REQ'D = 14 SPACES
NUMBER OF SPACES PROVIDED = 20 SPACES*
*STANDARD SIZE = 19 AND HANDICAPPED SPACE(S) = 1

SEWAGE FLOW:
3,600 SF OFFICE X 75 GPD/1000 SF = 270 GPD

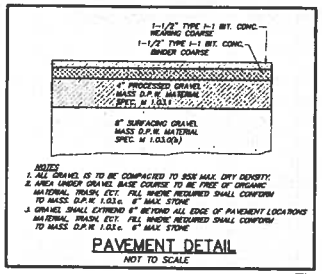
SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

LAYOUT PLAN
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=20' JUNE 27, 2014

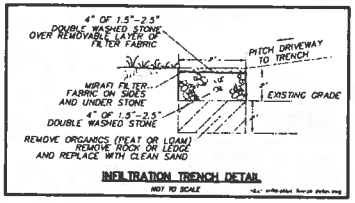
COMMONWEALTH OF MASSACHUSETTS
GEORGE DIMAKOPOULOS
CIVIL
No. 41597
REGISTERED PROFESSIONAL ENGINEER

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING
0 10 20 40 60 80 FT

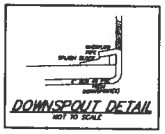
(4860-SPD.dwg) GREAT ROAD SM-4860 Sheet 4 of 6



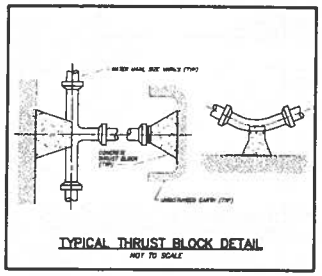
PAVEMENT DETAIL
NOT TO SCALE



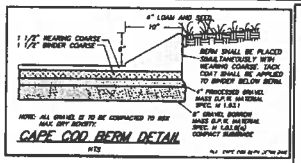
INFILTRATION TRENCH DETAIL
NOT TO SCALE



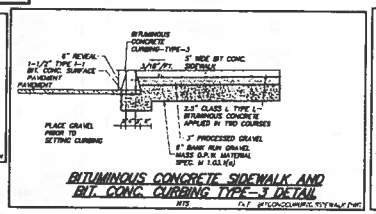
DOWNSPOUT DETAIL
NOT TO SCALE



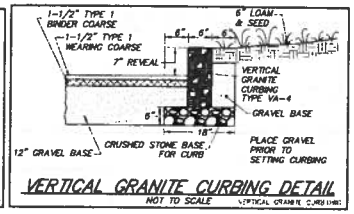
TYPICAL THRUST BLOCK DETAIL
NOT TO SCALE



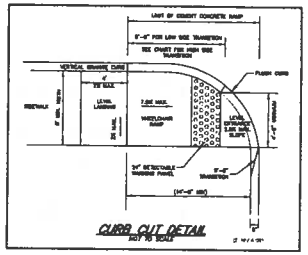
CAPE COD BERM DETAIL
NTS



BITUMINOUS CONCRETE SIDEWALK AND BIT. CONC. CURBING TYPE-3 DETAIL
NTS



VERTICAL GRANITE CURBING DETAIL
NOT TO SCALE



CURB CUT DETAIL
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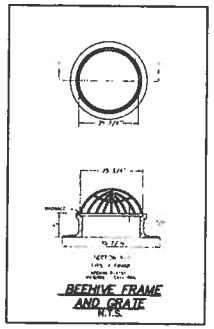
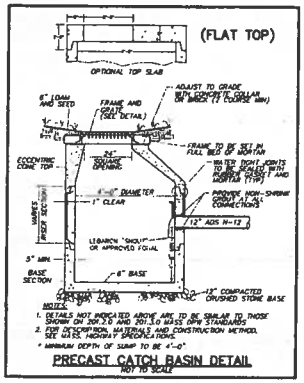


BEEHIVE FRAME AND GRATE
N.T.S.



PRECAST CATCH BASIN DETAIL
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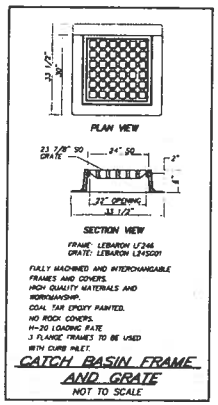

CATCH BASIN FRAME AND GRATE
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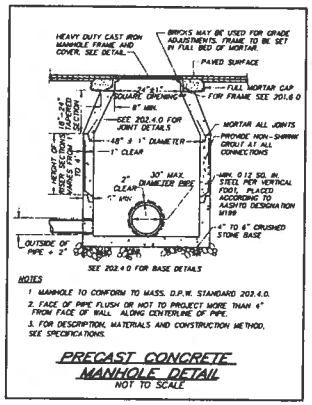
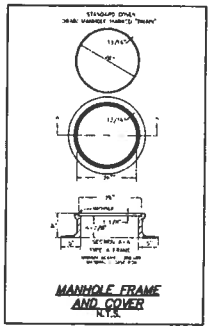


PRECAST CONCRETE MANHOLE DETAIL
NOT TO SCALE



MANHOLE FRAME AND COVER
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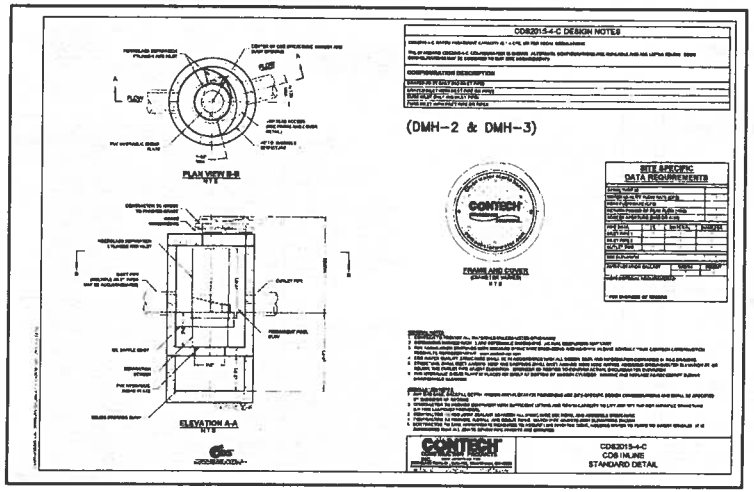
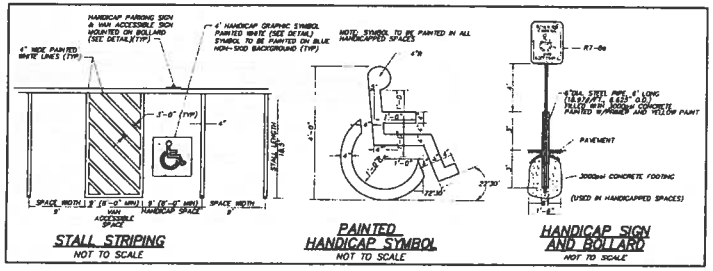




STALL STRIPING
NOT TO SCALE

PAINTED HANDICAP SYMBOL
NOT TO SCALE

HANDICAP SIGN AND BOLLARD
NOT TO SCALE

SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

CONSTRUCTION DETAILS
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=40' JUNE 27, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING
0 20 40 80 120 160 FT

(4860-SPC.dwg) GREAT ROAD SM-4860 Sheet 5 of 6

GENERAL NOTES

1. ALL UNDERGROUND UTILITIES SHOWN HEREON WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION OR REPAIRING. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE CONTACTED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. SEE CHAPTER 370, ACTS OF 1963 MASS. WE ASSUME NO RESPONSIBILITY FOR DAMAGE INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE APPROPRIATE PUBLIC UTILITY ENGINEERING DEPARTMENT MUST BE CONSULTED. DIG-SAFE TELE. NO. (888) 344-7233.
2. UNLESS OTHERWISE SPECIFIED ON THESE PLANS, ALL CONSTRUCTION METHODS AND MATERIALS SHALL COMPLY WITH SPECIFICATIONS OUTLINED IN THE ACTON ZONING BYLAW AND THE ACTON RULES AND REGULATIONS FOR SITE PLAN SPECIAL PERMITS.
3. ALL LIMITS OF WORK SHALL BE LOCATED IN THE FIELD PRIOR TO CONSTRUCTION OR SITE CLEARING.
4. ALL WATER PIPES, HYDRANTS, GATE VALVES AND OTHER APPURTENANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE ACTON WATER SUPPLY DISTRICT REQUIREMENTS.
5. ALL STUMPS AND OTHER CONSTRUCTION DEBRIS SHALL BE PROPERLY REMOVED. ANY FILL MATERIAL USED SHALL BE FREE OF HAZARDOUS MATERIALS OR WASTE.
6. ALL DRAIN PIPES SHALL BE ADS N-12 UNLESS OTHERWISE SHOWN.

7. TRANSPORTATION OF FILL, EARTH, OR CONSTRUCTION DEBRIS TO OR FROM THE SITE SHALL BE RESTRICTED TO DAYTIME HOURS (8 AM TO 4 PM) MONDAY THROUGH FRIDAY.
8. CONSTRUCTION SHALL BE IN ACCORDANCE WITH 521 CMR – ARCHITECTURAL ACCESS BOARD REGULATIONS. ALL PROPOSED SIDEWALKS SHALL HAVE A MAX. CROSS SLOPE OF 2% THE PROPOSED HANDICAP PARKING STALLS AND ADJACENT AREAS SHALL HAVE A MAX. SLOPE OF 2% IN ALL DIRECTIONS. A WAIVER TO THE REGULATIONS MAY BE NEEDED FOR HANDICAPPED PARKING SPACE LOCATIONS AND MUST BE CONFIRMED BY OWNER OR ARCHITECT
9. IT IS ANTICIPATED THE EXISTING SEPTIC TANKS, SOIL ABSORPTION SYSTEM, AND WATER LINE WILL BE ENCOUNTERED DURING CONSTRUCTION. THE EXISTING ONSITE SOIL ABSORPTION SYSTEM AND ASSOCIATED TANKS SHALL BE ABANDONED PURSUANT TO 310CMR 15.354 ABANDONMENT OF SYSTEMS OR REMOVED FROM SITE.
10. TURNING RADII HAS BEEN DESIGNED TO ACCOMMODATE A SU-30 VEHICLE.
11. ANY FILL MATERIAL USED SHALL BE FREE OF HAZARDOUS MATERIALS OR WASTE.
12. USE THE EXISTING GRANITE CURBING AT THE PROPOSED ENTRANCE TO FILL IN THE EXISTING ENTRANCE.

DRAINAGE SYSTEM OPERATION AND MAINTENANCE PLAN

1. BMP OWNER: ACTON MANAGEMENT, INC.
   69 GREAT ROAD
   ACTON, MA 01720

2. PARTIES RESPONSIBLE FOR MAINTENANCE: SAME AS ABOVE
3. SCHEDULE FOR INSPECTION AND MAINTENANCE:

DEEP SUMP AND HOODED CATCH BASIN:
THE DEEP SUMPS FOR THE CATCH BASINS SHALL BE INSPECTED AND CLEANED QUARTERLY. THE CATCH BASINS HAVE A FOUR FOOT DEEP SUMP AND THE WATER LEVEL IS MAINTAINED BY THE DISCHARGE PIPE AT FOUR FEET. THE DISCHARGE PIPE IS HIDDEN FROM VIEW BY A HOODED OUTLET.

THE DEPTH OF THE SEDIMENT IN THE BASIN SHALL NOT EXCEED A DEPTH OF 18 INCHES AS DETERMINED BY PROBING WITH A STICK. IF THE STICK HITS THE BOTTOM WITHIN 30 INCHES OF THE WATER LEVEL, MORE THAN 18 INCHES OF SEDIMENT HAS ACCUMULATED AND MUST BE REMOVED. LICENSED PERSONS SHOULD REMOVE AND DISPOSE OF THE CONTENTS OF THE SUMP IN ACCORDANCE WITH APPLICABLE REGULATIONS.

VORTSENTRY HS
INSPECTION AND MAINTENANCE OF THE VORTSENTRY HS CAN BE PERFORMED FROM THE SURFACE, WITHOUT ENTRY INTO THE UNIT. PERFORM MAINTENANCE A MINIMUM OF TWICE PER YEAR. THE VORTSENTRY HS SHOULD BE CLEANED ONCE THE SEDIMENT HAS REACHED A DEPTH OF TWO FEET IN THE CHAMBER.
PERFORM FREQUENT INSPECTIONS DURING THE FIRST YEAR OF INSTALLATION TO ACCURATELY ESTABLISH THE MAINTENANCE SCHEDULE.
REMOVE OIL AND SEDIMENT THROUGH THE MANHOLE COVER WITH THE USE OF A VACUUM TRUCK.

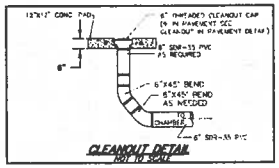
DISPOSAL FROM THE VORTSENTRY HS ARE SIMILAR TO THAT OF ANY OTHER BEST MANAGEMENT PRACTICE (BMP). CONSULT LOCAL GUIDELINES OR YOUR VORTSENTRY HS AREA MARKETING MANAGER PRIOR TO DISPOSING THE SEPARATOR CONTENTS.

SUBSURFACE RECHARGE AREAS:

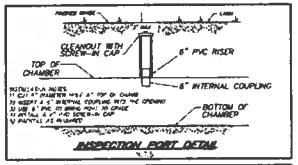
THE INFILTRATION BED CLEANOUTS SHALL BE OPENED AND INSPECTED ANNUALLY. IF THE WATER LEVEL IS MORE THAN 24 INCHES ABOVE THE BOTTOM OF STONE ELEVATION, THE CHAMBERS SHALL BE FLUSHED WITH A PRESSURE HOSE, AND IF AFTER 24 HOURS THE WATER LEVEL HAS NOT DROPPED, THE INFILTRATION BED MAY HAVE TO BE REPLACED. (NOTE: THE RELATIVE ELEVATIONS OF CLEANOUT RIMS AND THE BOTTOM OF STONE SHALL BE TAKEN FROM THE SITE PLAN AS-BUILT. THIS INSPECTION SHALL NOT BE DONE WITHIN 72 HOURS OF A RAIN EVENT.)

EMERGENCY CONTACTS:
IN THE EVENT OF A HAZARDOUS MATERIALS SPILL ON THE SITE THE FOLLOWING PARTIES SHALL BE CONTACTED: FIRE DEPARTMENT: PH. 978-264-9645

RECORDS:
THE OWNER SHALL MAINTAIN AN INSPECTION LOG OF ALL ELEMENTS OF THE STORM WATER MANAGEMENT PLAN. THE OWNER SHALL MAINTAIN A MAINTENANCE LOG DOCUMENTING THE INSPECTION AND MAINTENANCE OF THE DRAINAGE STRUCTURES UNDER HIS CONTROL. A COPY OF THE EROSION CONTROL AND STORM WATER MAINTENANCE PLAN AND INSPECTION LOGS SHALL BE KEPT ONSITE AT ALL TIMES



CLEANOUT DETAIL
NOT TO SCALE



INSPECTION PORT DETAIL
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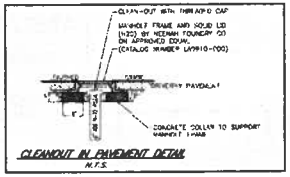

CLEANOUT IN PAVEMENT DETAIL
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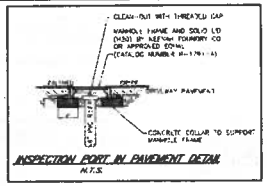

INSPECTION PORT IN PAVEMENT DETAIL
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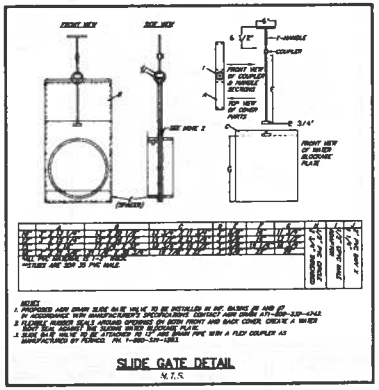
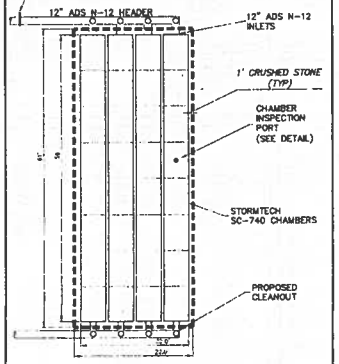


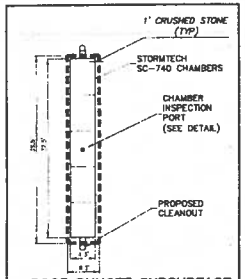
SLIDE GATE DETAIL
N.T.S.

SUBSURFACE RECHARGE AREA SCHEDULE

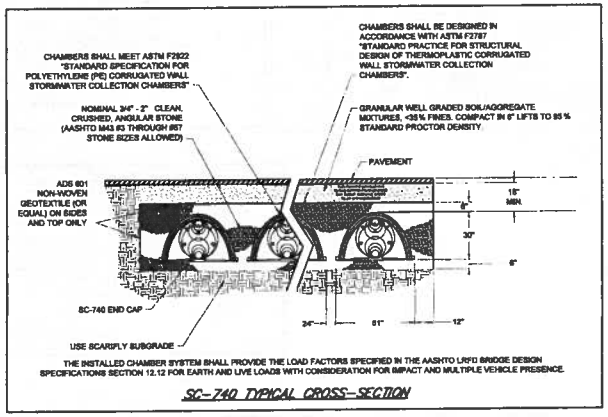
	INLET FROM	INLET INVERT	BOTTOM STONE	TOTAL CHAMBER LENGTH
PROPOSED AGRI DRAIN SLIDE GATE VALVE	DMH-2 & DMH-3	153.50	153.00	57'



SUBSURFACE RECHARGE AREA DETAIL
NOT TO SCALE



ROOF RUNOFF SUBSURFACE RECHARGE AREA DETAIL
NOT TO SCALE



SC-740 TYPICAL CROSS-SECTION

SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

CONSTRUCTION DETAILS
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=40' JUNE 27, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING
0 20 40 80 120 160 FT
(4860-SPC.dwg) GREAT ROAD SM-4860 Sheet 6 of 6

General Notes

1. All site information represented on this plan is illustrative, and must be verified by the contractor. Written specifications shall take precedence over representations on drawings.

2. It is contractor's responsibility to become apprised of existing conditions, underground utilities, and overhead utilities. Coordination with all relevant companies or agencies, including permitting & Dig Safe, affected by site construction is contractor's responsibility. The contractor is required to obtain any necessary permits required from local authorities for all work in this contract.

3. Contractor shall be responsible for on-site safety of construction crew, and particularly of safety of pedestrians during period of construction project.

4. Extreme care shall be taken not to disturb existing plant materials, except those specifically noted to be transplanted or removed. Any plant injured or destroyed shall be replaced with a plant of equal or greater size and species at the contractor's expense.

5. All unused materials that are removable shall be removed from site daily, or stored in such a way as to preclude loss or vandalism.

7. All debris shall be removed, and all areas made free of obstructions, and site left in a neat, clean condition at the close of each workday.

Planting Notes

1. The Contractor shall locate and verify all utilities prior to starting work.

2. The Contractor shall supply all plant materials in quantities sufficient to complete the planting shown on all Drawings. Plant counts are for convenience only. Contractor shall use sufficient plant materials to fulfill design intent, but in no case shall contractor use fewer plants than listed.

3. All material shall conform to the guidelines established by the "American Standard for Nursery Stock", published by the American Association of Nurserymen.

4. Contractor shall test soil in all plant areas and shall amend the soil as needed. Hard packed soil may need to be removed and replaced with rich, organic loam. The contractor shall grade and blend new sediment smoothly with existing contours. Fine grading must be accepted by the Owner's rep before planting begins.

5. All plants shall bear the same relationship to finished grade as original grade before digging. Plants to be transplanted shall be dug carefully, with adequate rootballs and pruned according to AAN standard practice.

6. All plants shall be balled in burlap or containerized, unless specified otherwise. All trees and shrubs shall be balled in burlap. No root bound container grown stock will be accepted. All plastic root wrapping and metal wire baskets shall be carefully removed at the time of planting, except that wire that is directly under the rootball.

7. All plant materials are subject to the approval of the Landscape Architect at the nursery and at the site. No unapproved substitutions will be accepted. All trees shall have a single leader unless specified otherwise.

8. Trees, shrubs and perennials shall be laid out on site according to the Planting Plan for the approval of the project Landscape Architect. Layout shall be completed prior to arrival of the Landscape Architect. Notify Landscape Architect at least 4 days prior to anticipated date of layout. Coordinate layout and planting observations with Landscape Architect.

9. Set plants and address plants. The Contractor is responsible for providing planting soil for backfilling of all plants. Submit written content analysis to Owner/Rep. for approval

9. Plant plants thoroughly once immediately after planting and twice during the first twenty-four hour period after planting. The Contractor shall maintain the plants for a minimum of 30 days following installation, or longer if contracted by the Owner. Before the end of the 30day period, the contractor shall provide a written maintenance outline to the Owners and the Contractor shall be available to answer questions or concerns at that time

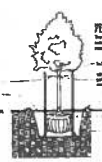
10. Mulch: Contractor shall place 2" - 3" of shredded bed mulch throughout the plant bed areas and around the bases at each new tree (24" diameter mulch bed, approximately). DO NOT PLACE MULCH AGAINST TREE TRUNKS. Submit sample of mulch for approval.

11. All trees and shrubs shall be sprayed with anti-desiccant within twenty-four hours after planting. All plants to be sprayed with an anti-desiccant the first week of November the first winter following planting.

12. All plants shall be guaranteed for a minimum of one year from the date of final acceptance of planting by the Landscape Architect. Contractor shall replace, at his/her own expense, any dead or diseased plants, or any plant material deemed by the Landscape Architect to be in poor condition.

13. For lawn areas—contractor shall submit seed mix for approval and shall discuss installation methods and procedures with Landscape Architect and/or Owner's rep. prior to construction.

14. All plants shall be guaranteed for a minimum of one year from the date of final acceptance of planting by the Landscape Architect. Contractor shall replace, at his/her own expense, any dead or diseased plants, or any plant material deemed by the Landscape Architect to be in poor condition.



Deciduous Tree Planting Detail
NOT TO SCALE

Coniferous Tree Planting Detail
NOT TO SCALE

Shrub Planting Detail
NOT TO SCALE

UTILITY NOTE:

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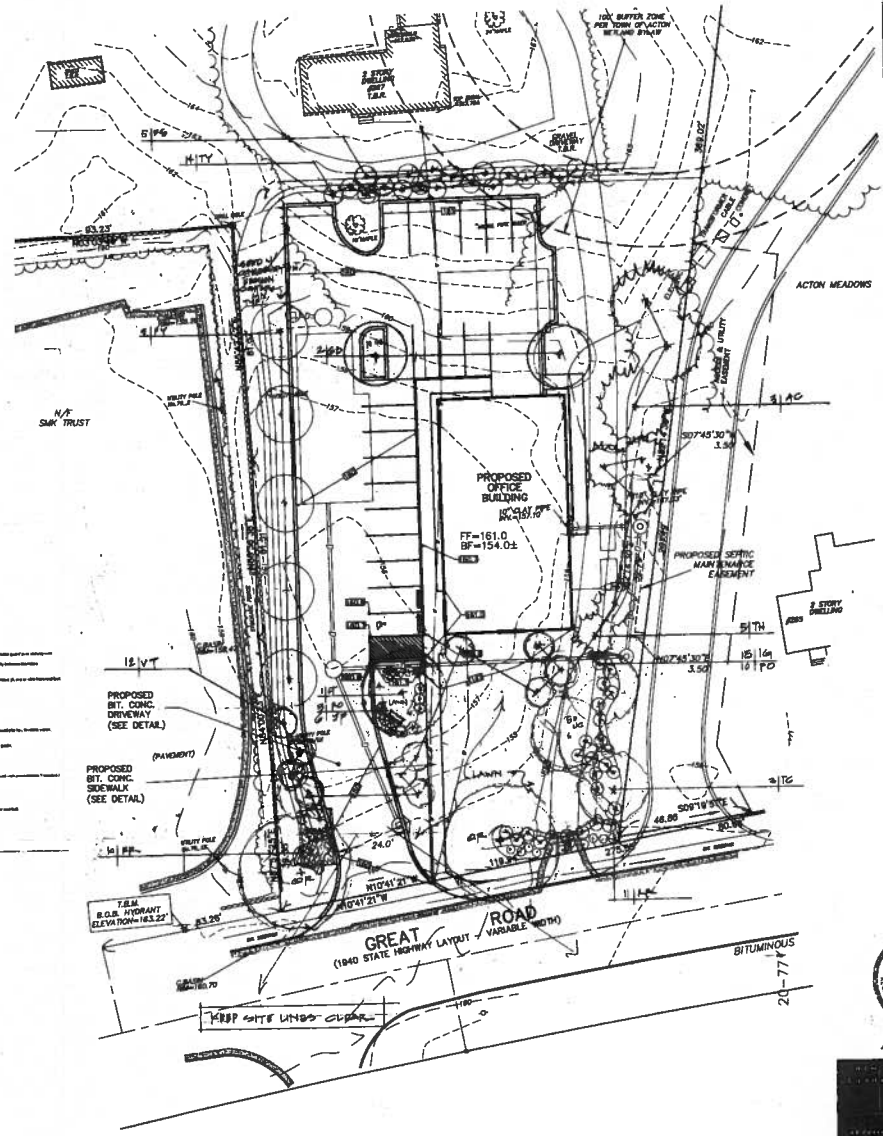


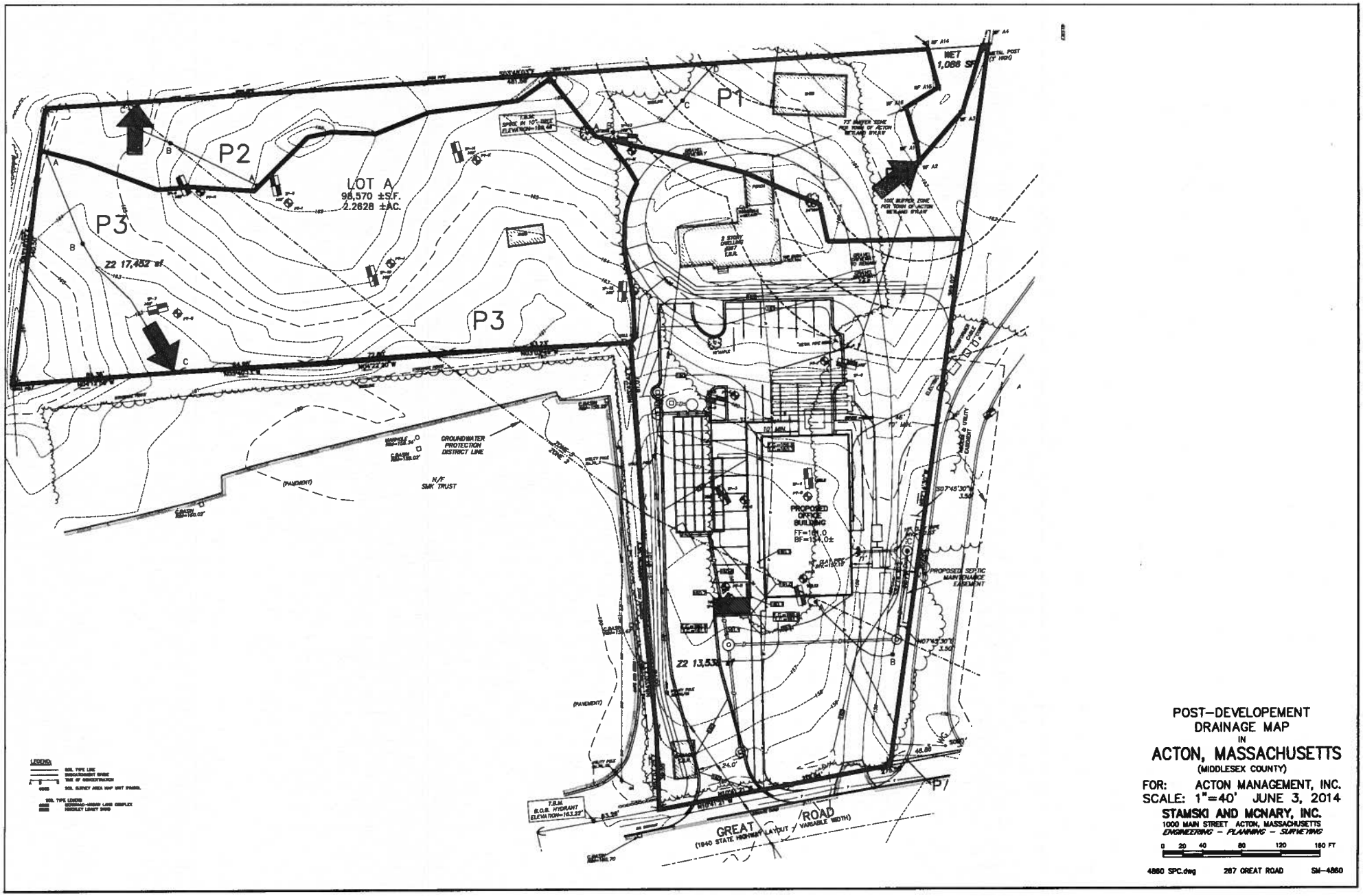
PLANT LIST

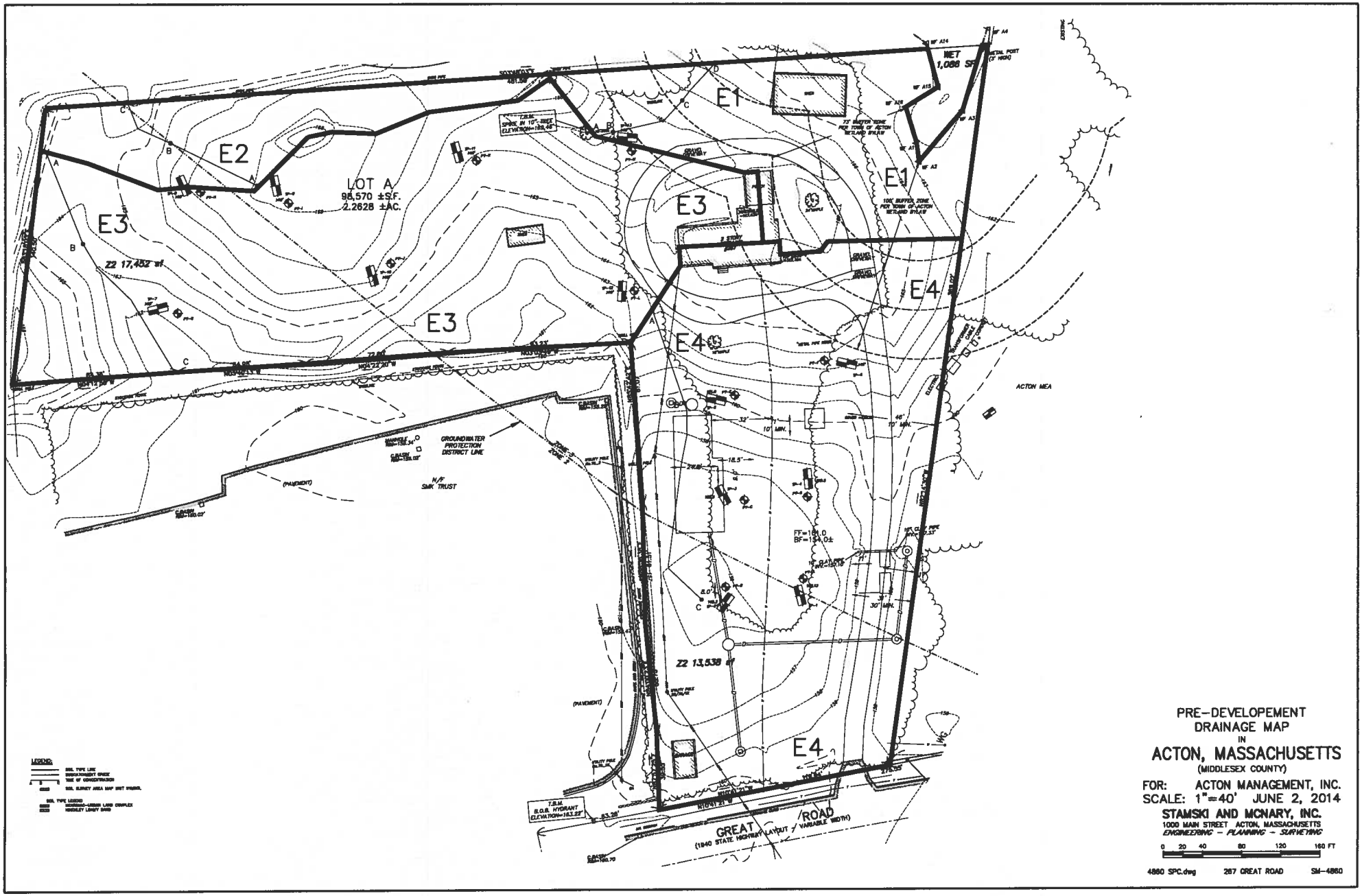
Symbol/Botanical Name	Common Name	No.	Size	Remarks
Deciduous Trees (all trees shall have a single leader unless noted otherwise)				
TC/Carpinus caroliana	American Hornbeam	9	2-2.5"C	Very nice, like symmetrical "Starting"
GB/Ginkgo biloba	Ginkgo	2	2-2.5"C	
LT/Liriodendron Tulipanifera	Tuliptree	1	2-2.5"C	Specimen shape Very Nice "Matchable"
PY/Pyrus calleryana "Arlinglorie"	Arlinglorie Flowering Pear	5	2-2.5"C	Matching
QR/Quercus rubra	Red Oak	2	2.2-3"C	Matching
Evergreen Trees				
AC/Abies concolor	White Fir	3	6-7'H	
TW/ Thuja 'Green Giant'	Green Giant Arborvitae	8	7-8'H	
Shrubs				
PD/Fothergilla gardenii	Dwarf Fothergilla	10	24-30"H	White flg early May; specimen plants
FX/Forsythia 'Lynwood Gold'	Lynwood Gold Forsythia	5	3-4'H	
IG/Ilex crenata 'Green Luster'	Green Luster Holly	13	18-24"H	Matching, full plants; evergreen
RD/Rhododendron 'Olga Mezitt'	Olga Mezitt Rhododendron	5	2.5-3'H	Loose, open form; matching
RP/Rosa rugosa	Rugosa Rose	11	18-24"H	
SW/Spiraea x bumalda 'Anthony Waterer'	Anthony Waterer Spirea	6	18-24"H	Full matching, CO acceptable
YT/Ilex glabra 'Green Lew'	Green Lew Barrow	4	#2 pot	
VT/Viburnum p.t. 'Shasta'	Shasta Viburnum	12	#7 pot	Full matching
Groundcover				
AC/Arctostaphylos uva-ursi 'Blue Pacific'	Blue Pacific Jewlow	60	1 Gal	8-12"H; Groundcover
Lawn—Grass seed mix for areas as shown on the plan	Clean or sand shade mix as appropriate			
Meadow/disturbed areas—Conservation/erosion control mix				

SITE PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

LANDSCAPE PLAN
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=20' JUNE 3, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING
0 10 20 40 60 80 FT
(4860-SPC.dwg) GREAT ROAD SM-4860


P1
P2
P3
P3
LOT A
98,570 ±S.F.
2.2628 ±AC.
Z2 17,452 sf
Z2 13,53
WET
1,068 SF
GROUNDWATER PROTECTION DISTRICT LINE
N/F
SMK TRUST
(PAVEMENT)
PROPOSED OFFICE BUILDING
PROPOSED SEPTIC MAINTENANCE EASEMENT
GREAT ROAD
(1940 STATE HIGHWAY LAYOUT / VARIABLE WIDTH)
LEGEND:
SOIL TYPE LINE
SOIL TYPE LENGTH
POST-DEVELOPEMENT
DRAINAGE MAP
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=40' JUNE 3, 2014
STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING
0 20 40 80 120 160 FT
4860 SPC.dwg
287 GREAT ROAD
SM-4860


E1
E2
E3
E4
LOT A
98,570 ±S.F.
2.2628 ±AC.
Z2 17,452 sf
Z2 13,538 sf
WET
1,088 SF
GROUNDWATER PROTECTION DISTRICT LINE
N/F
SMK TRUST
ACTON MEA
GREAT ROAD
(1940 STATE HIGHWAY LAYOUT / VARIABLE WIDTH)
PRE-DEVELOPEMENT
DRAINAGE MAP
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)
FOR: ACTON MANAGEMENT, INC.
SCALE: 1"=40' JUNE 2, 2014
STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING
0 20 40 80 120 160 FT
4860 SPC.dwg
267 GREAT ROAD
SM-4860